Industrial Hygiene Section

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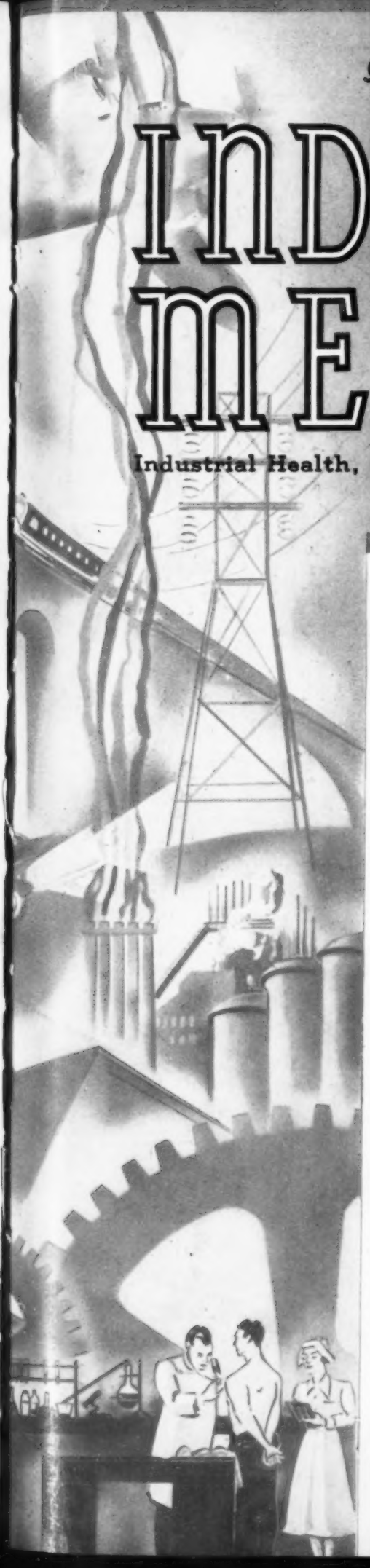

April, 1943

Industrial Truancy
— A Psychiatrist's View —

Prevention of Skin Rashes
— The Practical Solution of the "Cutting-Oil" Problem —

Nethacetin
— In the Management of Primary Dysmenorrhea —

Occupational Diseases
— Modern Trends —

Trinitrotoluene (TNT)
— Its Effective Removal from the Skin —

Educational Techniques
— In Industrial Nutrition —

Intracapsular Fractures
— A New Method of Nailing the Neck of the Femur —

Industrial Nursing Service
— A Suggested Yardstick for Judging Its Efficiency —

Exposure to Toxic Chemicals
— Preventive Medical Control —

Industrial Health and the War
— Statistics on Medical Causes of Absenteeism —

Control of Solvent Exposures
— In the Rubber Industry —

War Conference
— Industrial Physicians and Hygienists at Rochester in May —

Volume 12 Number 4

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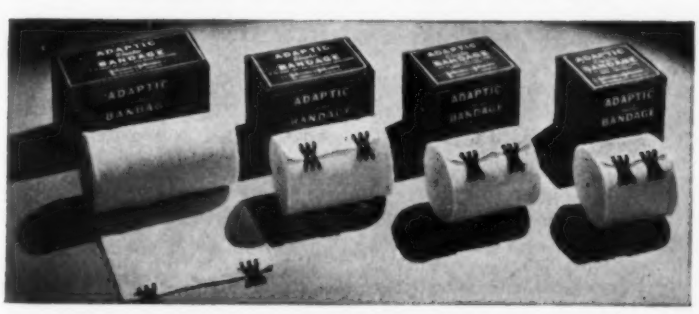

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WAR CONFERENCE

American Association of Industrial Physicians and Surgeons
(Twenty-Eighth Annual Meeting)

American Industrial Hygiene Association
(Fifth Annual Meeting)

National Conference of Governmental Industrial Hygienists
(Sixth Annual Meeting)

May 24-27, 1943 Rochester, N. Y.

FEATURE of the first day of the War Conference at Rochester, May 24, will be the presentation, by DR. JOSEPH SHILEN, of the results of a county-by-county survey of industrial medical facilities in Pennsylvania. DR. SHILEN is Director of the Bureau of Industrial Hygiene of that state's Department of Health, and the county surveys were made by his Bureau. The first one, undertaken in Lycoming county at the request of the county medical society, was published in our December issue. It was a thorough-going, detailed and interesting study—obviously the answer to the question of where and how to begin for county medical organizations and industrial health committees everywhere. The complete War Conference program will appear in INDUSTRIAL MEDICINE for May . . . DR. LOWELL SELLING looks at "Industrial Truancy" (page 189), and produces a text that ought to be read in every place where, and by every person to whom, employee absenteeism is a problem. This is essentially a study of that part of total absenteeism which can be called, as DR. SELLING so aptly calls it, "truancy"; the other part, which has a basis in the causes where the medical department is concerned, is fully and expertly broken down

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into its components by DR. LYNCH (page 236). These two articles, the one on the psychology and the other on the statistics, present about as complete a picture of the whole subject as can be put between two covers. Both are difficult to describe; they must be carefully studied to be even partly appreciated . . . WITH a parity of completeness, and a claim of its own to originality, DR. FOULGER'S "Exposure to Toxic Chemicals" (page 214) puts real substance underneath the concept of industrial medicine that embraces prevention. The term "preventive" has been a good shibboleth for many years—a sounding phrase on the tongues of exhorters, a crackling phrase in the mouths of the critics. It can't be a shibboleth any more; it is now a reality—a really remarkable advance in the science of medicine . . . DR. FAIRO (page 201) treats of a problem that is becoming increasingly important to industrial medicine . . . DR. GRAY'S "Occupational Diseases" (page 202) is still another of the very fine lectures at Long Island College of Medicine's postgraduate course in industrial medicine late last year . . . DR. NORWOOD (page 206) also makes prevention something that can be actually taken hold of—in more ways than one . . . DR. BIRAM'S "Prevention of Skin Rashes" (page 208) adds to the preventive context of this issue with a really practical solution of the cutting-oil problem. Apropos of his reference to the possibility that industrial medicine is mentioned in the Book of Job, maybe he has in mind that many a medical director has ample reason, these days, to feel that he is being equally set upon . . . DR. KUH'S "Educational Techniques in Industrial Nutrition" (page 210) re-emphasizes the fact that proper nutrition is almost as much a matter of education as it is of food . . . DR. POBORSKY (page 211) describes very briefly an interesting development in surgery . . . DR. RITTER (page 212), in his suggested yardstick for judging industrial nursing service, offers a basis of orientation as to the comparative values of the many things industrial nurses have to do . . . THE abstracts from Ohio State Medical Association's meeting on wartime health mention several things of timely interest. One is DR. LEGGO'S reference to the growing demand for physicians to report to top management instead of to other officers in other types of departments. Another is DR. MCCORMICK'S reference to the Beveridge plan as including medical care from "the womb to the tomb." This hooks in to the editorial (page 227) . . . . THERE is an item in "Comment and Opinion" regarding the National Industrial Conference Board's discovery that the excessive absenteeism from all causes makes it necessary for employers to keep extra men on the payroll. The number of the extras is fixed at 1,350,000. This, however, is only about 5%. Instead of being excessive, it is nearly normal—the oldest personnel men can remember that, when they began years ago, it was generally accepted even then that in order to get the full time work of 20 men, 21 men had to be kept on the payroll. The industrialists who have been testifying before the Truman Committee, as noted elsewhere in "Comment and Opinion," don't seem half as excited about the absenteeism figures as the statisticians, the economists, and the politicians. They characterize the much talk as mostly smoke with very little fire. Strangely enough, the smoke seems to have clarified one point at least, which is that by no means all absenteeism can be attributed to medical causes. . . . As to things the industrial physician *can* do, we go to press with an issue containing so many of them that its own sub-title might be "Preventive."

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THE staff of Mississippi's newly expanded industrial hygiene division now includes DR. J. W. DUGGER, director; DR. WAYNE RITTER, associate director; MORRIS A. NUSSBAUM, chemist; MRS. PEARL WALDEN, nursing consultant, and C. R. JONES, industrial engineer.

DR. JOHN W. CROSSON, Charleston, West Virginia, since 1940 director of the bureau of industrial hygiene of the state department of health, has resigned to become industrial consultant for Sharp & Dohme. He will be attached to the medical research staff at Philadelphia.

WESLEY C. L. HEMEON, of Brookline, Massachusetts, has been appointed industrial hygiene engineer on the staff of Industrial Hygiene Foundation at Mellon Institute, Pittsburgh. A graduate of Massachusetts Institute of Technology, Master of Science in 1927, he has been industrial hygiene engineer for the Massachusetts Department of Labor for the past seven years. Before that he was engaged in research and development for the Dewey and Almy Chemical Company.

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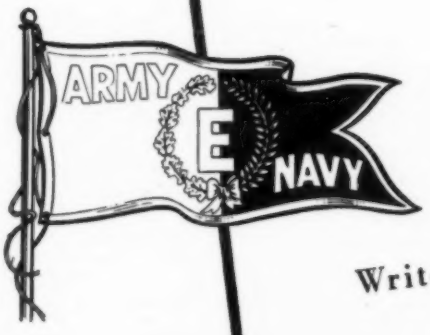

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DR. CHARLES F. KUTSCHER, a member of the Allegheny County Medical Society's Committee on Industrial Health and Hygiene, has been appointed Medical Adviser on the staff of Industrial Hygiene Foundation. A specialist in ophthalmology, DR. KUTSCHER is interested in all aspects of industrial health, especially in research and prevention. He has been aiding the Foundation for sometime in a toxicological investigation. DR. SAMUEL R. HAYTHORN, formerly Medical Adviser, is advanced to Medical Consultant on the staff.

DR. J. H. CHIVERS, Medical Director, Crane Co., Chicago, discussed "absenteeism from the medical point of view" at a meeting on "Absenteeism" sponsored by the Illinois Manufacturers' Costs Association at Hotel Sherman, Monday evening, March 22.

DR. HAROLD S. DIEHL, of Minneapolis, member of the directing board of the Army procurement and assignment service, said (at Milwaukee, March 3) that there were 13,000 doctors in the Army and Navy in December, 1941, and that one year later the number had risen to 42,000, entirely on a voluntary basis. "No other professional group has ever been called on in this country for such public service, or responded to a call so magnificently."

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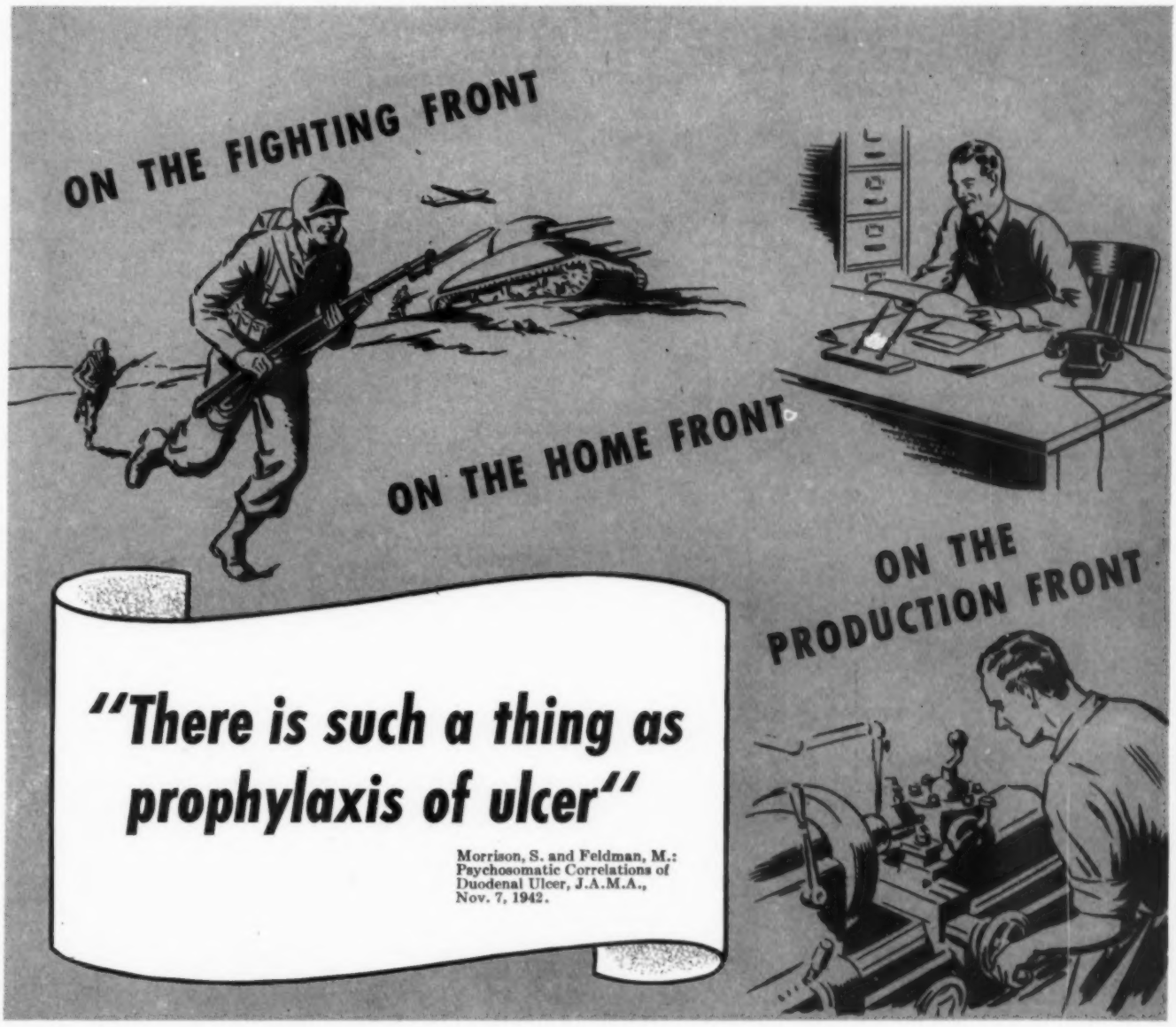
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Morrison, S. and Feldman, M.: Psychosomatic Correlations of Duodenal Ulcer, J.A.M.A., Nov. 7, 1942.

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BRIG.-GEN. WARREN F. DRAPER, executive officer of the U. S. Public Health Service, who is inspecting the facilities for medical care and accident prevention in the larger Detroit war plants, declared himself "impressed" by what he saw and praised particularly the efforts of management to protect workers from toxic fumes and chemicals causing dermatitis, the greatest single cause for disability. Questioned as to the possibility of remedying conditions in the vicinity of the Ford Motor Co.'s bomber plant at Willow Run, which local authorities assert are threatening to result in an epidemic with serious impairment of production, GEN. DRAPER said he was unfamiliar with the situation but that the U. S. Public Health Service was powerless to over-ride the War Production Board's veto on the allocation of critical materials for water mains, sewage disposal facilities or adequate housing.

—*Detroit News*, March 3.

THE New York Heart Association has organized a Committee on Cardiovascular Diseases in Industry, to advise industry concerning the employment of persons with cardiovascular diseases. It is planned to use the facilities of the New York Heart Association which consists of

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66 cardiac clinics, in furthering this work. DR. CLARENCE E. DE LA CHAPELLE is chairman; other members are: DR. DONALD B. ARMSTRONG, Metropolitan Life Insurance Company, DR. O. F. HEDLEY, U. S. Public Health Service, DR. ADA CHREE REID, Metropolitan Life, and DR. CASSIUS WATSON, American Telephone and Telegraph Company. It is planned to add to this membership as the need arises. Although this committee was formed to deal with cardiac problems in industry in New York City, it is not intended to limit the scope of its activities to that locality. Under the auspices of the New York Heart Association and the New York Academy of Medicine, a radio talk, "You Can Work With Heart Disease," was given by DR. CHARLES SHOOKHOFF over station WMCA, Brooklyn, New York, on March 13.

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* A. E. Imler, M.D., "Sulfallantoin in the Treatment of Wounds," The American Journal of Surgery, May, 1942.

** Koerber, Kenneth A., A.B., M.D., et al., Medical Department, Cramp Shipbuilding Co., Philadelphia: "Sulfallantoin in Industrial Medicine," INDUSTRIAL MEDICINE, October 1942.

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THE Manual of Industrial Hygiene and Medical Service in War Industries is ready in April. Under the editorship of DR. WILLIAM M. GAFAFER, Chief of the Statistical Unit of the Division of Industrial Hygiene, it has been prepared to assist industrial physicians, the general medical profession, industrial engineers and hygienists, and others in industrial service to protect the health of workers in war industries. The manual will contain about 500 pages; is being published by W. B. Saunders Company.

A SCIENTIFIC "detective force" of six dermatologists and one chemist has tracked down causes of skin disease—and prevented further outbreaks—in more than 50 government and privately-owned arsenals and war plants. Before these doctor-detectives of Public Health's Dermatoses Investigation Section went to work, almost 15% of the workers handling explosives in these plants suffered from some form of industrial dermatitis. The Dermatoses Investigation Section, known as DI, was organized in 1928 under the direction of DR. LOUIS SHWARTZ, medical director of the Public Health Service. His section gets reports on skin disease outbreaks when plant doctors are baffled, and the DI doctors go to work until they unearth causes and are able to prescribe preventive measures.

—OWI Release.

A FURTHER recent development in industrial health in Ohio was the selection of MAJ. CHRISTOPHER LEGGO, Surgeon (R), U. S. Public Health Service, to direct the Industrial Hygiene Service of the State Department of Health. DR. LEGGO is on loan from the Public Health Service to the State Department and has been assigned by DR. R. H. MARKWITH, State Director of Health, to head that service. DR. LEGGO is cooperating with the Industrial Health Committee of the State Association and has offered the facilities of his office and his own services to assist in launching its program. He comes to his new post with a background of 13 years in various phases of industrial medicine. During the past year he was Industrial Hygiene Physician for the Missouri State Board of Health, and prior to that he was a consultant in occupational hygiene for the California State Department of Health. He is an associate editor of INDUSTRIAL MEDICINE, and formerly served as secretary of the Western Association of Industrial Physicians and Surgeons. Formerly he was plant physician for the California and Hawaiian Sugar Refining Corporation.

—*Ohio State Med. J.*, March, 1943.

DR. HERMAN A. BRENNECKE, 71, founder of the Brennecke Clinic, of Aurora, Illinois, railroad and industrial surgeon since 1906, chief surgeon for a number of utility and manufacturing companies, and for 23 years medical director of Mooseheart, died March 20 at his home in Aurora.

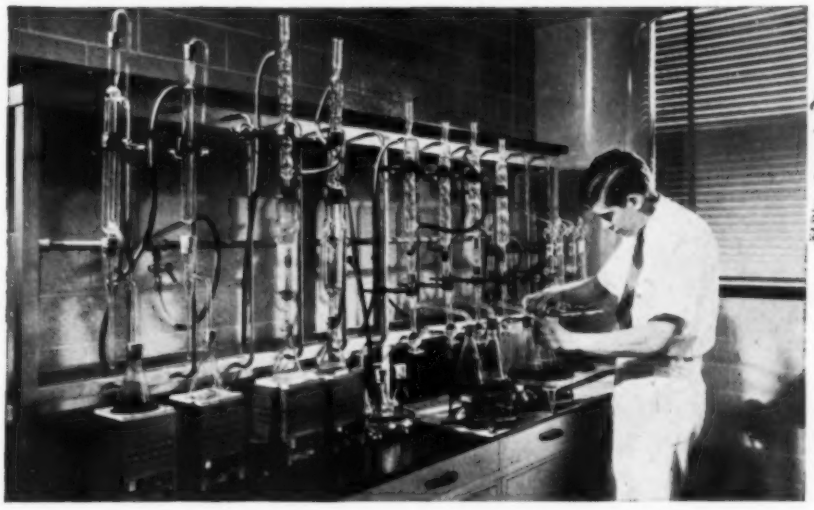
GENERAL

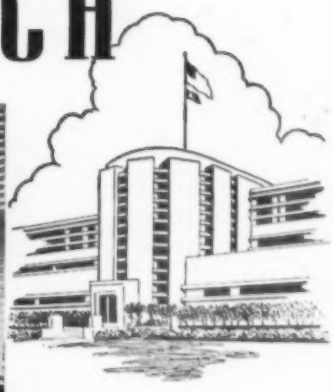
FOUR one-day institutes on industrial health were held in four Georgia cities, Augusta, Savannah, Atlanta, and Columbus, during March. Each included talks on community health problems, wartime health problems within industry, health services available to industry in Georgia, management's view of the physician's function in industry, labor's view of industrial health, recent developments in the handling of industrial injuries, nursing aspects of health program for industry, dental aspects of health program for industry and medical aspects of health program for industry.

SEVENTY-SEVEN war industries in 11 different states were surveyed by the eight 35 mm. photofluorographic units operating in industry prior to February 1, 1943, reports the Office of Tuberculosis Control, U. S. Public Health Service. A total of 194,896 individuals were x-rayed. Tabulations on results of the x-ray are available for 125,190 people. Of these, 1,631, or 1.3%, were found to have significant pulmonary tuberculosis. The distribution of the positive cases by stage of the disease was as follows: 874, or 53.6% minimal; 707, or 43.3%, moderately advanced; and 50, or 3.1%, far advanced. In the District of Columbia 28,098 government workers have been x-rayed. Exactly 300 cases (1.1%) of pulmonary tuberculosis have been discovered. Of these 182 (60.7%) were minimal, 106 (35.3%) moderately advanced, and 12 (4.0%) were far advanced. In addition, 1,300 workers at the National Institute of Health have been x-rayed. Among these 15 cases of tuberculosis were found—nine minimal and six moderately advanced.

—*Industrial Hygiene*, March.

SEARLE RESEARCH





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WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS under the presidency of DR. BENJAMIN J. FREES, will hold its third annual meeting April 29, 30 and May 1, at Los Angeles, just preceding the California State Medical meeting. The program is comprehensive and devoted solely to the problems of industrial medicine. Among the speakers from the east are: DR. WILLIAM A. SAWYER, Eastman Kodak Company, Rochester, New York; PROF. PHILIP DRINKER, Harvard University; DR. ROBERT A. KEHOE, Kettering Laboratory, Cincinnati; DR. LYMAN D. HEACOCK, Dental Surgeon, Bethesda, Maryland; DR. FRANKLIN BING, Chicago; and MISS OLIVE WHITLOCK, New York. This list will be augmented by outstanding physicians of the Pacific Coast area, who will present a symposium dealing with postwar rehabilitation in industry; minor traumata; surgery of the extremities; differential diagnosis of low back pain; repair of nerves and tendons, and other interesting subjects. Not the least important phase of the convention will be the exhibit of industrial hazards, such as occur in welding, spray painting, electroplating, degreasing, and similar operations. A field trip to some of the industrial plants in the area is contemplated for Saturday, May 1.

AT THE recently concluded session of the Arizona Legislature, an occupational disease law was passed providing compensation for total disability caused by occupational diseases. The law calls for the establishment of a state occupational disease compensation fund to provide insurance for employers, and defines the terms under which compensation will be paid. It also lists the compensable occupational diseases, which include silicosis and asbestosis. Appointment of a medical board of three expert consultants on dust diseases is provided for. They shall be licensed physicians in good professional standing and with at least five years of actual practice in the diagnosis, care, and treatment of diseases of the pulmonary tract, together with the interpretation of x-ray films thereof. Other diseases will have similar expert boards. Inasmuch as the law holds the last employer liable, Arizona mine operators, in order to protect themselves against undue claims, are urged to take precautions against the employment of persons who already are afflicted with silicosis but not yet disabled, persons who are tubercular, who have a history of tuberculosis, or who are from tubercular families. In doubtful cases, the employer is urged to request a physical examination and x-ray, together with a statement by the prospective employee as to his previous employment and tubercular record. These precautions are considered advisable since the law provides that persons giving false information or deliberately withholding essential data are ineligible for the benefits of the act.

—*Mining Jornal*, March 30. 1943.

THE best interests of both industry and society would be better served if the infected persons were put to work, or retained at their jobs, and treated, than if they were dismissed to completely unsupervised treatment or none at all, and to enforced idleness and despair. The exclusion from hazardous occupations of those who have cardiovascular or central nervous system syphilis, or who are otherwise physically unfit for their jobs, is a problem in individual selection, and should not depend upon the indiscriminate denial of employment to all persons with genito-infectious disease. Neither the blood test nor the smear is any criterion of the physical condition or the occupational capacity of any person; nor is either prognostic of what the future may bring forth. Their use as a key to employment is as unsound, medically, as it is unjust.

—From a review, in "Venereal Disease Information," U.S.P.N.S. publication, of "Genito-infectious Disease and Employment," by N. A. NELSON, in *Bull. Genito-infectious Dis.*, October, 1942.

FOLLOWING preliminary organization, the activities of the county medical society's committee on industrial health will fall mainly under four major headings: (*a*) Investigation of local causes of lost time in industry as a basis for necessary remedial service. (*b*) Coordination of community industrial health facilities. (*c*) Frequent education of the public about the benefits of an industrial health program. (*d*) Continuous education of the medical profession as a means for elevating standards of industrial health service.

In all other ways the committee should exercise that degree of initiative and leadership which will properly represent medicine's responsibilities in this important field.

—From "An Industrial Health Program for a County Medical Society," Council on Industrial Health, *J.A.M.A.*, January 23.

FACTORY
Hard-of-Hearing Workers
Now Finding Jobs
The war is opening doors to deaf and partially deaf men and women who previously have had a much more limited chance of finding employment.
While exact statistics are unavailable, it is estimated that there are probably 5,000,000 hard-of-hearing persons in America, including women and children. Officials of the United States Employment Service report that they are having little difficulty in placing persons with deficient hearing in industrial jobs. The employment service of the New York League for the Hard-of-Hearing had a constant backlog of 300 to 500 job-seekers before the war, its officials point out, whereas today the League has a waiting list of prospective employers. League officials say that employers are finding hard-of-hearing persons especially acceptable for jobs requiring concentration.

Western Electric Hearing Aid Dealers are ready to cooperate with you . . . With corrected hearing deafened workers do more than make good.

WHY HARD-OF-HEARING WORKERS ARE MAKING GOOD . . . AND RATE HIGH

FACTORY has given you the good news in a few words:

Thousands of men and women with impaired hearing are making good in all kinds of war work. Thousands more are available!

With corrected hearing, deafened workers do *more* than make good. They *earn* advancement. They carry *greater* responsibilities. They make *permanent* places for themselves.

Ask personnel directors who have studied their performance. They are highly pleased with the records of these producers. Ask plant executives and office managers. They have tested and proven these newly found workers.

Think of it—countless thousands of able, experienced workers who have the desire and ability to make good! Think what this means today in the light of our staggering need for greater manpower. Think of the immediate results these exceptional workers can produce!

That is why the Graybar organization, national distributors for the world-famous Western Electric Hearing Aid, is conducting an all-out campaign on this phase of the wartime personnel problem.

Covering war production centers from Coast to Coast, 22 Graybar Hearing Aid Specialists and 300 Western Electric Hearing Aid dealers and technicians are concentrating on this vital wartime service.

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Write or call your Western Electric Hearing Aid Dealer. Look for his name in the Classified Telephone Book.

An expert technician, he does 2 jobs for you . . . (1) He helps you increase the efficiency of deafened workers now in your organization . . . (2) He helps you find new workers of proven ability.

Remember, he brings you the accumulated experience of the Graybar and Western Electric Specialists—and applies that experience, with his own practical ability, to your personnel problems.

Wartime needs are urgent. This special personnel service is real—is producing results. Write your Graybar Branch for our FACTS FOLDER entitled "Why Deafened Workers Make Good." Or call your Western Electric Hearing Aid Dealer. The time to act is now!

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OUR STERILIZER

Gets Fresh Water Every Morning

LIME and mineral deposits make any sterilizer heat slower; best method of prevention is rinsing and draining the boiler each night and adding fresh water next morning.

Fill your Pelton Sterilizer to bottom of instrument tray with tray elevated; use until insufficient to cover load completely, before refilling. Distilled water is desirable for your instruments' sake. Always boil fresh tap water a few minutes alone before inserting instruments.

Free on request: "Precision Technique with Pelton Sterilizers."

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OF THE war plants visited in 1942 by Department of Labor's 554 safety engineers, all volunteers, about 42% had had no formal safety programs and were paying no special attention to safety. About 27% more had partial safety programs which were not successful in cutting down accidents. As a result of recommendations to management, 545 plants employed full-time safety engineers, 1,075 designated a top-operating official as the responsible head of the safety organization and to act as a safety director in addition to other duties, and 5,230 established joint labor-management safety committees. Through these joint committees, labor also has assumed increasing responsibility for accident and disease prevention. As the six labor members of the Committee said in a recent report, the man on the job or at the machine is usually best informed as to its dangers. Shop stewards have attended safety training classes. Labor has requested and distributed thousands of copies of the safety pamphlet material supplied by the Department of Labor. Clauses have been written into collective bargaining contracts calling for active cooperative safety programs between management and workers. When deaths and disease occurred in the synthetic rubber industry from the use of toxic solvents, particularly benzol, appeals of workers brought requests from the War Production Board to the Department of Labor for assistance. Union, management, and government representatives, as well as industrial hygienists and physicians of national repute, surveyed the plants affected. Their work had the immediate effect of dispelling fear and furthering the correction of hazards.

—OWI Release.

ALLIS-CHALMERS, whose Supervisor of Help and Safety is GEORGE F. NURENBERG, organized its wartime safety program so effectively that it was able to reduce its accident severity rate by 52.7% and its accident frequency rate by 13% in the last six months of 1942, despite an enormous increase in new employees and the development of many new manufacturing processes.

CIVILIAN physicians with civil service status will be employed by service commands for medical service in industrial plants operated by the Army to relieve medical officers for troop duty. Expert medical supervision is provided to insure industrial hygiene in army operated arsenals and depots. In establishments where the work involves occupational health hazards, periodic physical check-ups of the workers are conducted. Women physicians may be employed at army plants at the discretion of the commanding officer. This practice has been recommended for plants employing a high percentage of women. A civil service examination announcement for physicians and civil service forms to be used in making application may be obtained at any first or second class post office.

KANE COUNTY Medical Society and the Fox River Valley Manufacturers' Association in cooperation with the state medical society, the state manufacturers' association and the division of industrial hygiene of the state department of public health sponsored a conference on "Health of Industrial Workers" at Aurora, Illinois, March 10. DR. JOHN W. DREYER, Aurora, presided, and DR. ORLEN J. JOHNSON, Chicago, spoke on "Better Local Industrial Health Organization"; DR. MILTON H. KRONENBERG, Chicago, on the "Problem of Women in Industry"; DR. PAUL A. BREHM, Madison, Wisconsin, on "Absenteeism in Industry," and DR. EDWARD C. HOLMBLAD, Aurora, on "How the Small Plant Can Conduct a Health Program." A dinner meeting, presided over by DR. RICHARD K. COLLINS, Aurora, president of the Kane County Medical Society, with W. M. WILLETT, Aurora, vice-president of Western United Gas & Electric Company, as toastmaster, was addressed by ARNOLD P. BENSON, Batavia, president pro tem of the state senate, on "Why I Am Interested in Promoting an Industrial Health Program," and DR. CHAUNCEY C. MAHER, Chicago, on "The Health of the Executive."

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ALL theoretical considerations aside, proof of the safety and efficacy of a burn preparation rests solely upon its action when used on burns and scalds.

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Consisting of 15% aloes (U.S.P.) and 5% chlorbutanol (U.S.P.) in a special petrolatum and calamine base, CALOE OINTMENT (Cole) is easily applied on bandages that may be readily and painlessly removed after the requisite periods of treatment.

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The large scale on which Physical Therapy measures are being used in the armed services indicates the great possibilities of this field of treatment.

The trend toward a wider use of Physical Therapy in civilian practice is seen in the fact that a course on this subject is now in effect in leading medical schools.

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INDUSTRIAL Hygiene Foundation, Pittsburgh, has been collaborating in a study of sick absenteeism with a group of its member companies and with the U. S. Public Health Service since January 1, 1941. At the Foundation's last annual meeting, a panel was devoted to the reduction of absenteeism. The six participants, DR. R. R. SAYERS, DR. W. M. GAFAFER, DR. J. J. WITTMER, NED H. DEARBORN, DR. SIMON S. LEOPOLD and DR. WILLIAM H. KUSHNICK, have since amplified their discussions. This accumulation of practical data, most of it merely summarized at the meeting, has been assembled in a 63-page report on "More Manpower Through the Reduction of Absences."

THE Buffalo (New York) District Committee for Industrial Health, of which DR. HERBERT H. BAUCKUS, Buffalo, is chairman, has drawn up minimum medical standards for use in industry. The recommendations, which have been distributed in the Buffalo area, are designed to meet low cost health improvements in various plants differing in size and accommodations, and emphasize the need for good sanitary facilities as a prerequisite to prevent the spread of communicable and occupational diseases, the value of preventive vaccinations, the prevention and care of colds, and the need for selection in foods. A meeting of the study committee for industrial health of the Medical Society of the State of New York was held in Buffalo recently to discuss plans for accelerated promotion of industrial health committees similar to the one in Buffalo. Cities considered for proposed committees were Rochester, Syracuse, Utica and Schnectady.

AT PRESENT the following Federal establishments have medical departments under the direction of a physician: War Department, War Production Board, Office for Emergency Management, Bureau of the Census, Government Printing Office, Bureau of Engraving and Printing, Treasury Department (including its Bureaus, the Labor Department, Bureau of the Budget, and the Office of War Information), National Bureau of Standards, Veterans Administration. The Office of Price Administration has authorized a program to be started soon.

CHEST x-rays to detect tuberculosis in its early stages, similar to x-rays taken for this purpose at induction centers, are now being made in industrial plants here under the direction of the Massachusetts State Department of Public Health. Having the x-rays taken is voluntary on the part of the employees, but in industrial plants where the work has been done today, response has been almost 100%, extending from the officials of the companies down through the ranks.

—*Springfield, Mass., Union.*

THERE *will* be a conference of the American Industrial Nurses Association this spring, says President CATHERINE DEMPSEY, despite the impression of many industrial nurses that the war had ruled meetings out for the duration. However, to cooperate with the Office of Defense Transportation, the A.I.N.A. will call together only board and committee members, officers of all state industrial clubs, and representatives of local industrial organizations. "The preservation of industrial health this year is more important than ever," explains MISS DEMPSEY. "As the only national group made up entirely of industrial nurses we have a responsibility which we cannot ignore. Nursing opinion is essential to every industrial health program, but we can't expect industry to consult us if we do not first come to conclusions among ourselves. That is the object of this year's conference." The officers of the association have been cooperating with the U. S. Public Health Service in mapping out current standards for industrial nursing, having met in Cleveland late in January for discussion with OLIVE WHITLOCK, industrial consultant for the U.S.P.H.S. From the material to be discussed at the conference it is expected new policies and plans will emerge which should benefit both employees and factory managements. The conference will be held May 1 and 2, at the Hotel Roosevelt in New York City.

Item in *R.N.*, March.

PHYSICAL WELL-BEING IS VITAL TO PRODUCTION

Time and production losses due to common forms of muscular aches, wrenches or strain, can be minimized by the application of a famous Johnson's Red Cross Plaster. The beneficial effects of this time-honored medicated plaster are attributed to warmth, anodyne effect, physical support and passive massage. Try this approved treatment on your next patient.

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COD LIVER OIL OINTMENT (HART)
Stimulates epithelization and promotes healing with minimum scar formation. Valuable in the treatment of Burns, Wounds, Abrasions and Varicose Diabetic and Decubitus Ulcers. An excellent means of applying U.S.P. Cod Liver Oil without its unpleasant features.
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The original water soluble Ephedrine Nasal Jelly. Relieves nasal congestion promptly and peasantly. Particularly convenient for ambulant patients.
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The Quick, Pleasant, Stainless, New Benzyl Benzoate Treatment for Scabies.
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COMMENT and OPINION

I HAVE faith in tomorrow, for I have seen the most wonderful yesterday that ever happened on this planet.

—WILLIAM ALLEN WHITE, addressing Executives Club of Chicago, March 19.

ONE of the important services the doctor can render his country right now is in connection with war industry. Many of the insurance companies and industrial organizations which employ physicians, require membership in county medical societies, while all of them respect the fact of membership as at least a recommendation as to professional standing.

—From an Editorial in *Texas State J. Med.*, March.

WHAT about blood-giving by industrial workers? Does it slow them down, increase absenteeism? The Industrial Hygiene Foundation is preparing a memorandum to members on this subject which will be issued shortly. It contains replies by the medical committee and other specialists to these questions. The American Red Cross has requested copies for distribution and has asked to release a summary of the memorandum to the press.

THE great bulk of industry comprises plants too small to warrant full time medical service. In these instances, the important thing is an application on the part of the physician of the importance of prevention. He must realize the relationship between working conditions and the health of the worker. There are several plans for the small plant. The most important part of all of them is that the work is done in the plant.

—DR. PAUL H. BROWN, health commissioner, quoted in *Stamford, Conn., Advocate.*

IN CONCLUSION, I should like to emphasize the two factors which I believe to be absolutely essential in securing the highest productivity of women employees. The first is a complete and comprehensive study of the *individual* applicant. This involves a thorough physical examination by the medical staff, and includes the taking of a detailed history of past illnesses, however minor, which may indicate a predisposition to more serious forms of ill health. A study should also be made by competent staff members of the applicant's entire personality, including intelligence, character, temperament, special aptitudes, and special shortcomings. Alertness, carelessness, emotionalism, timidity, self-confidence—a knowledge of all such attributes is important in fitting the worker to the job. The second, but no less important essential is job analysis. There are many jobs in which one man carries out a number of operations, some of which could be done by an individual with less physical strength, less experience, and perhaps less training. Such a job should be analyzed and split up into operations that can be done by a woman and those that cannot.

—From "The Health Problem of Women in Industry," by DR. J. M. CARLISLE, at Seventh Annual Meeting, Industrial Hygiene Foundation.

THE warning of DR. VICTOR HEISER that there are foci of bubonic plague in our western states is brought to mind with the report of a case in a baby in California. This is the first human case in this country in more than a year, when there were two fatal cases in the same locality.

—*Medical World*, March.

WHEN IS A RESPIRATOR? This is the title of an interesting little item in the February *Industrial Health News Letter* issued by the Industrial Hygiene Service, St. Louis County Health Department in cooperation with the Missouri State Board of Health, for distribution throughout Missouri. The item reads: "An employee wearing a good general duty respirator died as a result of fumes he breathed in through the respirator while cleaning pipe line screens on the bottom of a gasoline tank car. This case emphasizes the fact that respirators are designed for use in specific types of atmosphere. Care should be taken that workers are equipped with the proper breathing apparatus for the atmosphere in which they are to work."

—*Industrial Hygiene*, March.

JOHN STUART MILL early observed the basic importance of a cultivated desire for expensive living if sustained industrial effort is to be achieved. Mill pointed out that this importance of expensive tastes was particularly true in the tropics where nature made existence easy and saving pointless. A few generations later he would probably have included Social Security as a variety of tropical climate. Taking this classic observation to heart, one employer of my acquaintance told me how he reduced excessive absenteeism during the last war by encouraging the sale of expensive furniture to his factory workers on extended time payments. A second employer's retort was that a much simpler procedure would be to invite a few professional gamblers to set up a shop near the plant.

—From "Industrial Absenteeism," by A. T. COURT in *Wisconsin Med. J.*, March.

GOLDEN and Ruttenberg tell dramatic stories of steel mills about to go into bankruptcy that were saved when they stopped fighting their workers and took them into creative partnership. They frankly advise management leaders that one way to keep industrial peace is to give the unions something to do.

Don't force them into being mere bargaining agents for wages, hours, and working conditions. They are likely to resort to strikes, tie-ups and other struggles, if only to blow off steam. The authors tell management to take advantage of the creative desires and practical ideas of workers by a program of union-management cooperation to reduce costs, eliminate wastes, improve quality, and increase productive efficiency. The fruits of such cooperation are to make management more efficient and unions more cost-conscious. This increases the earnings of both workers and owners. The best actual machinery for such cooperation seems to be the worker-management production committees which have been developed so successively during World War II.

—From "Workers and Bosses are Human," by T. R. CARSKADON, Public Affairs Committee, Incorporated.

CAN the general practitioner hope to study the entire field of chemical poisons, thousands in number, which have been developed and are daily adopted to new industrial use? Obviously, this cannot be done. Even the expert, who spends much of his time in the consideration of special conditions, does not keep abreast of the developments of modern research. Though much is known, and our knowledge is reasonably complete, of the effects produced by benzol, lead, chromium and dozens of other widely used chemical agents, the general practitioner is not always familiar even with these. He cannot be expected to study, nor will he easily find, authoritative discussion of many agents which may not yet have been fully reviewed through research.

—From "Industrial Disease and the Insurance Carrier," by ROSCOE N. GRAY, in *Rocky Mountain Med. J.*, March.

PERIPHERAL vascular diseases or their complications, acquired as the result of industrial accidents, are of considerable importance for several reasons. They are very disabling, and the disability frequently continues for a long time. However, there is not only the economic loss to consider, but the anatomical and functional integrity of the limb is also frequently at stake, and occasionally life itself is threatened. Finally, a significant percentage of these cases need never occur if persons suffering from peripheral arterial or venous disease were not permitted to work at jobs where the danger of injury, particularly to the feet and legs, constitutes a recognizable industrial hazard.

—From "Industrial Aspects of Peripheral Vascular Disease," by LAWRENCE N. ATLAS, M.D., in *Ohio State Med. J.*, March.

ONE must not lose track of the fact that the eye, a single unit of the body is influenced by general physical fatigue. Lowered production is the most easily recognized result of fatigue. Another result is slowness in response to stimulation. A work-

HERE'S ONE WAY TO HELP KEEP MEN ON THE JOB!

MUCH of sick-absenteeism can be blamed on preventable nuisance illnesses like colds and sore throat which travel rapidly through a group of workers. This flagrant form of sabotage may often be materially reduced through the elimination of contamination points.

★ A Vulnerable Spot to Watch

One such point in plants and factories where large groups of men and women work together may be the drinking water source. Fortunately, the old familiar water bucket with its come-one-come-all dipper has been outlawed rather generally. But even with more modern drinking facilities, carelessness . . . mouth contact with anything that has touched the lips of others . . . invites infection.

★ The Easiest, Safest Answer

Dixie or Vortex paper cups at the fountain are an economical health protection. Once used, each cup is discarded . . . a fresh, clean, safe cup is ready for the next person. And to take a drink to the men at their work, the modern water boy serves with a Dixie Portable Water Carrier . . . with its own supply of paper cups. Saves workers' time, too.

Yes, here's one way to help keep men at work, on the job!

Dixie and Vortex cups are made at Easton, Pa., Chicago, Ill., Darlington, S.C., Toronto, Can.

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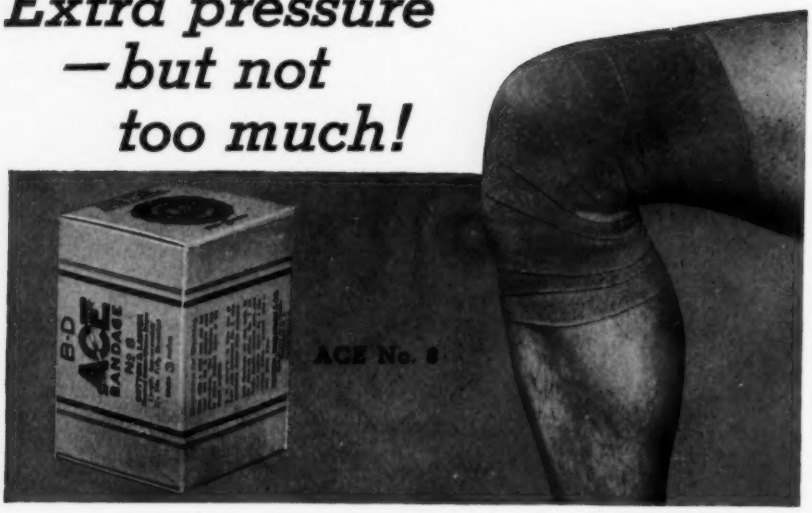

FREQUENTLY you need more pressure than the regular No. 1 All Cotton Ace Bandage affords. This is the spot for the No. 8 Tension Ace Bandage, skin-tone, flat edge, with Lastex strands interwoven in the fabric.

You get the extra pressure of pure rubber but you are protected by a controlled stretch which does not permit unlimited tension. Furthermore, it may be washed repeatedly without pulling, bunching or premature deterioration.

When extra pressure is indicated, we suggest that you try Ace No. 8 with Lastex. A brief test on your own arm will indicate the tension required to secure proper pressure.

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man who is fatigued does not see, does not hear, and does not understand, and does not act with his accustomed speed. No one will deny that poor vision, whether due to insufficient light, or to ocular defects is one of the principal factors in causing fatigue, not only of the eye, but of the entire body. The prevention in industry in general, and of ocular injuries in particular, has been a crusade of the times. There is no dearth of literature upon both general and ocular care. Even on the latter, volumes have been written and the reader can seek out details. Of paramount importance is the fact that in spite of the ability of science to develop artificial hands, arms and legs, no one has produced an artificial eye that can see—nor can any one deny that 95% of the eye injuries are preventable.

—From "Detection and Control of Defective Vision in Industry," by HORACE W. REID, M.D., in *Ohio State Med. J.*, March.

THE chief function, and in many instances the only function, of nurses in industries has been the treatment of traumatic injuries. Today, with the growing acceptance of a public health point of view by physicians, nurses, employers and employees, the scope of the industrial hygiene program has been expanded to include, in addition to the treatment of traumatic injuries: the prevention of occupational and non-occupational diseases and injuries, and the promotion of robust health. This broadening of the scope of activities demands of the modern industrial hygiene program increased emphasis upon educational and preventive measures. Therefore nurses are realizing more and more the necessity for special professional preparation. Today nearly all of the universities which offer approved curricula in public health nursing include courses in industrial hygiene. Several universities have planned more extensive programs of study which combine academic work and observation, or actual experience in industrial establishments.

—From "Public Health Nursing in the Industrial Health Program," by MARY D. FORBES, R.N., in *Public Health Nursing*, March.

INDUSTRIAL absenteeism follows a rather marked pattern related to certain days of the week, suggesting a considerable voluntary factor. In general, absences are less frequent on paydays and quite high following payday. Moreover, there is a tendency for absences to be numerous on days adjacent to a week end or holidays. As an interesting example of this, in a certain plant over a period of several weeks, the absence rate on Friday paydays was about 4% and on Mondays following payday almost 11%.

—From "Industrial Absenteeism," Industrial Health Page, *Minnesota Med.*, March.

FORTUNATELY for the safety of this nation, American industry has remarkable vitality which stems from long established and constantly improved techniques of adapting processes to human capacities and of correlating the activities of human beings, from failure to be too much impressed by obstacles and handicaps, and from remarkable and constantly growing ability to apply the findings of science to the needs of the people—and that is simply a broad definition of research.

—From an address on "The Importance of Scientific Research in Industry," by LOUIS RUTHENBURG, President of Servel, Inc., Evansville, Indiana.

WE RETURN to work the next day 75% of all patients with Colles's fractures and over 50% of patients with Pott's fractures. We return to work on the same day, within an hour, 75% of all of our patients with severed extensor tendons and the next day practically all of our patients with severed flexor tendons. The majority of our injured employees go back to work and work cheerfully and painlessly and have minimum disability as the result of physical therapy and occupational therapy.

—DR. JAMES H. BIRAM, medical director, Colt's Patent Fire Arms, in discussion on rehabilitation, Fifth Annual Industrial Health Congress; *J.A.M.A.*, March 13, 1943.

ONE must distinguish between the malingerer and the hysteric. This is not always easy but can usually be done by the attitude of the individual. The difference is in the state of mind. It has been said that the hysteric suffers from a psychic abnormality, while the malingerer suffers from a moral abnormality. The hysteric believes that he can't see but desires good vision and is anxious to cooperate with the examiner. The malingerer knows that he can see but tries to mislead and deceive the examiner. He is often sulky, uncooperative and, at times, even hostile toward the doctor.

—From "Visual Malingering," by A. G. ATHENS, M.D., in *Minnesota Med.*, March.

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"It's convenient, comfortable...and confidential"

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*Magid, M. O. and Geiger, J.: *Intravaginal Tampon in Menstrual Hygiene.* Medical Record, May, 1942.

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IN OUR armed forces, the Mental Hygiene Unit of the Army Medical Corps is able to cure 75% of recruits who are found to be mentally unfit. This neuro-psychiatric "reconditioning" is found necessary for men in the armed forces even before they are sent into actual combat. Such "war nerves" exist also in our "army of production," and the problem must be met in industry in much the same manner as it is met in the armed forces. It is necessary for the personnel interviewer to observe and recognize symptoms which may develop into serious problems in the productive efforts of the war worker. An unstable individual, although apparently an adequate physical specimen, can and often does cause serious delays in this all-important effort to produce war materials. It would seem important that the personnel worker be trained or selected for his knowledge of this, one of our subversive "columnists."

—From "Industry and the Sick Column," by P. M. ANDREWS, in *Connecticut Industry*, March.

MENTAL and physical fatigue may be eased by rest, but relief from nervous fatigue requires special measures. It is nervous fatigue, according to W. H. FORBES, in the Harvard University Fatigue Laboratory, that makes people say, "I am tired." Three circumstances cause nervous exhaustion, urgency to work at full capacity, emotional strain and distracting stimuli.

Modern Medicine, March.

A PROGRAM has been formulated in Michigan for the training of physicians for replacements in industry—part of a plan whereby the state committees on procurements and assignment and on industrial health may assist industry in solving the medical procurement problems of industry. The first weeks' work will cover preventive aspects, the second, field work, and the third, observation of working methods in full time medical departments. No charge is made for instruction, but physicians will pay their own living expenses. The training will be given by the bureau of industrial hygiene of the state department of health.

PROMOTION to a job with a precipitous increase in responsibility and salary may induce a severe depression in some persons, avers DR. N. B. FLANAGAN, of Boston. Reliable but conscientious employees may become severely depressed when faced with promotions, and be unable to adjust themselves to the new job. Industrial physicians and personnel officers can usually recognize employees liable to promotion depressions, for these individuals are invariably fastidious workers who give fussy attention to detail. Men suitable for promotion are those who are able to delegate work to others.

—*Modern Medicine*, March.

THE committee has now had on file for some months the names and pertinent data concerning 300 or more Massachusetts physicians who have signified their interest in and their availabiilty for industrial medical practice. These data are also compiled on a punch-card system at the office of the Division of Occupational Hygiene of the State Department of Labor and Industries, and its availabiilty was brought to the attention of the Associated Industries of Massachusetts at their annual meeting last fall. The fact that there have been only three or four inquiries from industrial plants seeking medical service, after what would seem to have been adequate publicity concerning this list, indicates that in Massachusetts at least the supply of industrial medical service is ample, and still is in excess of its demand.

—DR. DWIGHT O'HARA, chairman, Massachusetts Committee on Industrial Health, in *New England J. Med.*, March 18.

UNDERNOURISHMENT, resulting from slighting breakfast or lunch, is probably an important cause of industrial injuries, recently declared DR. JOHN H. FOULGER, Director of the du Pont Company's Haskell Laboratory of Industrial Toxicology. "From the standpoint of efficiency in work," he said, "there is no more pernicious practice than the common American one of eating only a light breakfast, little or no lunch, and a heavy meal at the end of the day. Even though the day's total intake of food seems adequate, this habit, to which women are particularly prone, leaves the individual insufficiently nourished during most of his working hours." War workers who do not eat properly are apt to be less resistant to certain health hazards and may also be less alert

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Today the nation-wide swing is to this faster, new wet-dressing therapy. Save man-hours by speeding healing—specify Domeboro Tabs!

*See *Manual of Dermatology*, Military Medical Manual, National Research Council, pages 376, 377.

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and sure in their movements, DR. FOULGER observed. "They may thus injure themselves or others by clumsy use of equipment. They may even produce a major accident, or, in a war explosives plant, a fatal explosion."

—*Medical World*, March.

READERS DIGEST for April, 1943, under the title "Industry Pioneers in Medical Care," condenses from *Forbes* of March 15, an article by Henry Morton Robinson describing the medical care plan of Endicott Johnson as an example of arrangements maintained completely at the company's expense, and the program of Consolidated Edison of New York as one of the successful programs to which both employer and employee contribute. As to what the employees think of DR. WITTMER'S program, it is mentioned that on several occasions the unions have required as a condition of collective bargaining agreements that the various benefits be retained.

THE effect of prolonged but moderate lack of thiamin, without a corresponding restriction of calories, is reported by WILLIAMS et al in *Arch. Int. Med.*, 69:721 (1942). Emotional instability, moodiness, irritability, quarrelsomeness, lack of cooperation, mental depression and fears, and restricted activities were found to be the result of this avitaminosis. These mental and physical signs appeared a considerable time before other and more objective manifestations. In such cases, it is believed that not only should the thiamin requirements be determined, but environmental factors, activity, diet and intestinal absorption should be considered.

—*Medical Times*, March.

THE eyes present an interesting and widespread problem to the industrial physician and placement supervisor. The abnormalities range from simple refractive errors to muscle imbalance and serious and complicating disturbance of the inner structures of the eye. Blanket approval or disapproval of persons should not be assigned without considered judgment in each case. Specialists in this field have contributed greatly, to the benefit of the employee and employer, in retarding eye deficiencies and advancing corrective measures to reduce to a minimum the dislocation of workers. Deficiencies in color perception will obviously interfere with placement in some textile fields, in work handling multi-colored wires in cables, in transportation where it is necessary to observe signals and in other fields in which acute color perception is essential. It need not hamper persons in general industrial work. Eye refractions to correct vision, general health measures to correct or retard disease of the eyes, and finally placement to obviate the demands of close application or other eyestrain completes the threefold approach to handling and disposing of handicapped persons falling within this category. The results obtained by follow-up supervision of workers with eye defects are an inspiration and fully justify the advisability of the program.

—From "The Employment and Placement of Handicapped Persons in Industry," by HARRY BARTLE, M.D., in *J.A.M.A.*, March 27.

IT IS an established fact that the mother's health is best conserved by spacing children by 18 months to two-year intervals. The Division of Industrial Hygiene of the U. S. Public Health Service has urged every war plant to have a counsellor on personal problems, and has recommended that married women workers receive advice as to the proper spacing of children as a means of protecting the health of both mother and child. It has been urged that every woman working in industry should have this service available. Since the presence of women in war industries has become an essential factor in carrying the war to a successful termination, every means should be exercised to preserve their health and ability to carry on their work with as little interruption as possible. Consideration of this matter should elicit the serious attention of all employers of women in war industries.

—From an Editorial in "The Pregnant Woman in Industry," *Northwest Medicine*, March.

STRENUOUS physical labor in itself is not necessarily a cause for fatigue, except under extreme conditions. A machinist or a welder, for example, would balk if asked to perform the same number of foot-pounds of work in a day as a farmer

PROCEED WITH SAFETY...

THAT Mandelamine possesses marked therapeutic effectiveness against organisms present in pyelonephritis (bacillary)—including that of pregnancy—and in cystitis, prostatitis, and infections accompanying renal calculi or instrumental trauma, is a matter of record.

Of no less importance in the treatment of these conditions is the safety factor. With Mandelamine therapy, the physician may proceed safely, confident in the knowledge that the course of administration will be generally free from the nausea, vomiting and diarrhea which are common interruptions of treatment when either mandelic acid or methenamine is used individually. This easy toleration to Mandelamine makes it significantly valuable in obstinate cases of urinary infections in which the medication must be continued for a lengthy period.

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Water, the chief constituent of tissues, conveys all material to those tissues. Water now carries a more soluble form of sulfonamide to inhibit bacteria in contaminated wounds, and burns, and in purulent skin diseases such as impetigo. This new and improved aid to industrial physicians consists of sulfathiazole-sodium 5% in a jelly vehicle. It is known as

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Concentrated at the site of accessible local infections, repeated applications of Sulthigel may be made to maintain bacteriostatic action, yet the amount of drug in the blood stream remains surprisingly low.

"Certainly, at the present time, there is no reason to consider any other local antiseptic treatment until sulfathiazole has been given an adequate trial."—Green and Parkin of Sheffield, England, in the Lancet (August 22, 1942).

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or miner. The physical exertion, however, does not harm the latter, and the boys in our Army and Navy are casually performing feats of physical prowess today which yesterday they would have regarded as suitable for a circus. It's not the work that causes fatigue, it's the work and the man. Industry today is trying to absorb thousands of misfits, of 4F's. Many of these men just haven't got the physical endowment for strenuous work and never will have. They can become candidates for fatigue, our type of fatigue, just because they cannot become adapted to a given set of working conditions. Exactly the same situation exists as far as mental exercise is concerned. Certain individuals can sit at a desk day after day and do work that amounts to adding long columns of figures. Try to put other men at that same job and they would back down before the day is over. These extreme situations, of course, are obvious, but the fact which is so often overlooked is that there exists a host of individuals in a middle zone, people who are almost but not quite adapted to the work they are doing. Here fatigue will not show up for a long time, not perhaps until it is brought to the surface by some totally unrelated factor. Whether on a physical or a mental basis, the situation remains the same. Any individual will become tired and fatigued if he is on a job for which nature has not given him the necessary equipment.

—From "Mental Fatigue, Morale and Hours of Work," by THOMAS L. SHIPMAN, M.D., Works Physician, General Electric Company, Lynn, in *Industry*, March.

Unusual Exposures

UNUSUAL exposures to several toxic materials have recently been reported by the Division of Industrial Hygiene of the Los Angeles County Health Department. The following items were considered of special interest: (1) *Carbon Monoxide in Metalizing*—In certain repair shops where brakedrums were being built up by metalizing with steel wire, employees complained that the fumes made them sick. These fumes consisted of iron particles about four microns in diameter which, when taken in through the mouth, produced a peculiar taste and some other vague symptoms. It was also noticed that metalizing being done with brass wire did not produce white zinc oxide smoke. It was then suspected that the metalizing was being done in a reducing atmosphere of excess acetylene and that there might be a possibility of high concentrations of carbon monoxide. Tests made on a large scale metalizing job using steel wire confirmed this premise since concentrations of carbon monoxide as high as 500 parts per million in the breathing zone of the operator were recorded when metal screens had been placed around the location to prevent the dispersion of large particles throughout the room. (2) *Fluoride and Chromium from Electric Welding*—The welding rods used in welding armor plate had produced numerous cases of throat irritation. Analysis of the composition of these rods showed high percentages of fluorine and chromium. Atmospheric samples at the welder's breathing level showed concentrations of fluorine averaging 2.6 mg./cu.m. and ranging from 1.6 to 5.1 mg./cu.m. Chromium concentrations were approximately 10 times the maximum amount permitted for chromic acid. It was the concensus that the production of hexavalent chromium compounds or chromic acid in appreciable amounts in the welding operations was improbable and that other forms of chromium would not be toxic in the concentrations encountered. Consequently it was assumed that exposure to fluorine had caused the workers' throat irritation. While the maximum permissible concentrations of fluorine for continuous exposures have not been established it was recommended that the concentration should be kept at as low a level as possible and preferably below 1 milligram per cubic meter.

—From *Industrial Hygiene — Current News of Official Industrial Hygiene Activities*, March.

Meaningless Statistics

IT SEEMS that years ago there would have been devised a uniform means of determining correctly the number of industrial accidents and the number of actual man-hours lost in industry through accidents. Yet today such important facts are not correctly known, due to the lack of uniformity among the states in recognizing and reporting time lost from accidents as the result of dif-

NOTHING IS TOO GOOD FOR THESE MEN . . .

Seriously . . . any dietary extreme would be justified if it were necessary to ensure an optimal supply of essential vitamins for industry's workers.

For men doing hard physical work, an adequate daily intake of the vitamin B Complex is imperative if physical fitness is to be maintained.†

When vitamin B Complex is indicated as an addition to a ration, a natural product such as yeast would seem to be a source of all the necessary components.†

Specially prepared from selected brewers' yeast, Wyeth's Elixir B-Plex* is a palatable and potency-protected preparation of the richest natural source of the whole vitamin B complex. Each teaspoonful contains the water-soluble active constituents of 60 grains of high-grade brewers' yeast.

†JOHNSON, R. E.; DARLING, R. C.; FORBES, W. H.; BROUHA, L.; EGAÑA, E., and GRAYBIEL, A. (The Fatigue Laboratory, Harvard University and The Thorndike Memorial Laboratory, Boston City Hospital, Boston, Massachusetts): The Effects of a Diet Deficient in Part of the Vitamin B Complex Upon Men Doing Manual Labor, J. Nutrition 24: 585-596 (Dec. 10) 1942.

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BIODYNE OINTMENT is a sterile dressing designed specifically for the treatment of burns and wounds. Its development resulted from a long series of basic studies of cellular growth and metabolism at the Institutum Divi Thomae of Cincinnati under the direction of Dr. George Speri Sperti — and represents a new concept in the treatment of burns and wounds.

The chief advances in burn therapy, represented by the ointment, reside in the incorporation of the respiratory-stimulating and proliferation-promoting concentrates. These are natural cellular products, prepared in the former case from yeast and, in the latter, from animal and fish livers. They belong to a group of natural substances, generated by cells, which participate in the regulation of cellular growth and respiration. These substances have been termed "biodynes" (from the Greek words for life and force), whence the name of the product.

It would seem desirable to maintain normal respiratory metabolism during the treatment of lesions. Germicides, which are desirable to maintain sterility of the lesions, may slow the healing process by their toxic action on the tissue. Biodyne Ointment therefore contains a concentrate of natural respiratory-stimulating factors which offsets the respiratory depressing action of the germicide without sacrificing germicidal efficiency.

As the result of years of observations by competent physicians, it has been established that Biodyne Ointment, without the incorporation of a local anesthetic, relieves pain.

End results show a soft but firm epithelization spread over the lesions, throughout which can be seen networks of fine capillaries, indicating that proliferation of the several layers of the derma has taken place. Glands and hair follicles may regenerate if their cells have not all been destroyed. Scar tissue and keloids are minimized.

5D8036—Biodyne Ointment, in one-ounce tubes, per dozen . . . **$7.80**
In 1-pound jars, per pound **5.50**
In 5-pound jars, per pound **4.30**

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ferences in the waiting period. Such confusion, of course, makes it impossible to collect accident and illness statistics on a uniform basis. Thus, we are faced with a situation wherein casualties largely defy accurate recording. Another instance may be cited equally important in the progress of educational development in industrial disease prevention, and this is the number of man-hours lost per year in industrial operations due to occupational sickness. We frequently read that 60% of occupational disease cases are chargeable to dermatoses, but there is a widespread need to know more about this generality. How many man-hours of time lost does this represent, and what is the total loss to industry on account of industrial disease? What does it mean in terms of absenteeisms, compensation and the other various costs and losses which the worker, the employer, the state and the nation suffer?

—From an Editorial in *Safety Engineering*, January, 1943.

Burden of Proof

SOME nurses in industry may still hold the opinion, as many physicians do, that her sphere of usefulness begins and ends in the plant dispensary. In large establishments with a full-time physician the activities of the nurse usually are somewhat limited, but even here she can find many opportunities to become aware of the general industrial environment, to teach safety and health, and to suggest resources for helping the worker meet his problems. The nurse in the so-called small plant with 500 workers or less, and with little or no direct medical supervision, will soon find considerable time on her hands if her activities are limited to the dispensary. Management usually discovers this situation also and requires the nurse to do clerical work, or to attend the plant telephone switchboard, unless she can prove the activity in her own field will be of greater value to workers and employer. At the present time the nurse cannot look to the physician for assistance in such a situation, because, with few exceptions, the part-time or "on call" physician is still practicing industrial medicine on a curative or therapeutic basis, rather than accepting the opportunities presenting themselves in the field of preventive medicine.

—From "Responsibility of the Nursing Profession in Industry," by J. W. CROSSON, M.D., in *Public Health Nursing*, February, 1943.

Morale

"WORKERS and Bosses are Human: Collective Bargaining at Work," by Thomas R. Carskadon, the seventy-sixth in a series of popular, factual, 10 cent pamphlets issued by the Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York, shows the productive efficiency of workers to be more closely linked to morale than any other factor. "There is definite evidence that working conditions, how a worker feels about his job and what happens to him on the job, affect not only his health but his output." In experiments at the Hawthorne plant of Western Electric the girls on the assembly bench, who had a real sense of "participating" and "accomplishing," increased their production under all conditions of work. A group of men, on the other hand, who were deliberately kept in the dark about the nature of the experiments, were mistrustful and kept their production level down despite an opportunity to increase their pay.

Make the Best of It

RECENTLY during ceremonies attendant on the award of an Army-Navy "E" to the tank plants of the Fisher Body Division of General Motors, E. F. FISHER, general manager, attempted to explain to employees why production schedules change from day to day, with resultant lay-offs and cessation of work. His remarks awakened widespread interest. They resulted in a better understanding within the plants by the employees. He said: "There have occurred in this and other of our plants what may have appeared to you to be inexcusable interruptions of work. It certainly does not appear on the surface to be efficient operation when we work long hours of overtime, and on Sundays and holidays, and then close down for a day or two waiting for materials or necessary tool changes. Unless all the facts are known, these constant face-abouts may easily be interpreted as managerial blunders, poor planning, or even governmental

Bringing to wartime America the increased significance of GOOD POSTURE

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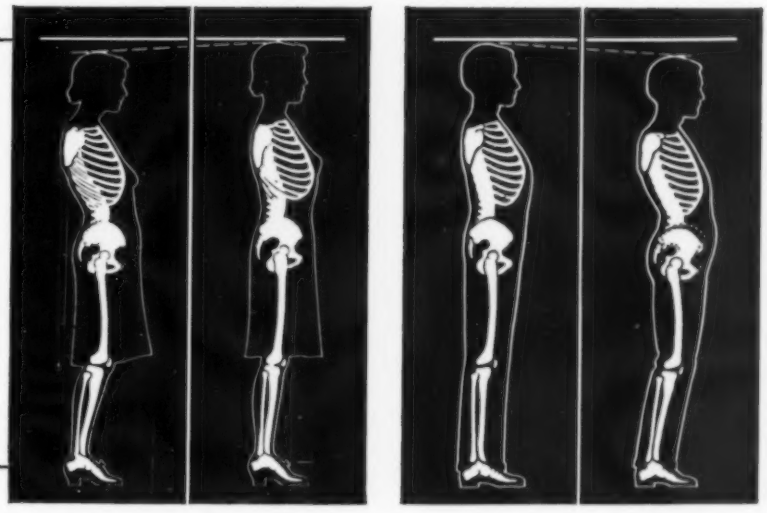
CAMP

NATIONAL POSTURE WEEK

MAY 3rd TO 8th



TODAY, more emphasis than ever before is being placed upon *good posture* as an essential factor in our nation's well being. That is why, this year, National Posture Week becomes more far-reaching and significant than at any time since its inception . . . Why, this year, it should be of more than usual interest to the medical profession.

"Fitness for Victory"—slogan of this 5th National Posture Week—will ring like a battle cry from one end of the country to the other. Press, radio, schools, colleges and civic groups will voice the challenge—"How are you standing up to the extra demands of total war . . . are you *fit* to do *your* share for victory?"

We believe that this message will inspire more men and women to better posture . . . will encourage those suffering from poor body mechanics to seek professional advice. We hope the aims and precepts of this program will warrant the full approval and support of the medical fraternity this year, as in the past.

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FREE A BOOKLET ON POSTURE FOR YOUR PATIENTS

Doctors all over America—particularly in industrial plants and army camps—have ordered thousands of this 16-page ethical booklet. They have expressed satisfaction with the way "Blue Prints for Body Balance" clearly explains authentic posture information to the layman in easy-to-read, non-technical language. Prepared by the Samuel Higby Camp Institute for Better Posture, it can be obtained in any quantities you wish by writing the

Samuel Higby Camp Institute for Better Posture. Address: Empire State Building, New York City.

Book is 3¼ inches by 6¼ inches. Printed in blue. Profusely illustrated with skeletal diagrams as above.

Gremlins

of sphygmomanometry ... EXCESSIVE RATE OF FALL

It is common practice to increase pressure in the cuff in steps of approximately 10 mm. until the radial pulse disappears. Pressure is then increased 20-30 mm. to determine complete closure of the artery. It is common knowledge that should the rate of fall exceed 2-3 mm. per second, a lag error may result, even in a properly constructed mercurial instrument . . . but the possibility of an even greater error is introduced in *any type* apparatus with an excessive rate of fall, for by just missing a beat, a drop of 5-10 mm. may take place before the succeeding heartbeat is heard. Proper technique calls for a 2-3 mm. per second rate of fall of the indicator. Therefore, controlling the *release* of pressure is of paramount importance in accurate bloodpressure taking.

The inherent accuracy which is built into every individually calibrated Lifetime Baumanometer is at the disposal of all who demand consistently accurate bloodpressure readings. Any lag error caused by pressure compensation is readily avoided by keeping the rate of fall within the prescribed 2-3 mm. per second. The Baumanometer Air-Flo Control Valve facilitates accurate control in this important phase.

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inefficiency. But we cannot operate, in war, on the 'steady flow' basis to which we were accustomed in peace time. Frequently engineering changes are required immediately to meet the continually changing conditions on the fighting fronts. Frequently materials must be quickly transferred to other—and for the time being—more important projects. Sometimes schedule changes must be made in the middle of a day's production to meet an emergency requirement. That is war. That is what we are all up against. But let us remember that the soldiers at the front cannot wait. When the boys in the fox-holes are running low on munitions they cannot take a few days off to wait for more. They must fire every gun as long as it will fire. That is exactly what we on the production front must do—work to our utmost each day with all the resources at our command. Material shortage may have handicapped us yesterday; tomorrow the government might find it necessary to alter our entire program. Nevertheless our job today is to be on the job, producing all we can, the best we know how. That is wartime efficiency. It is radically different from the accepted standard of peacetime efficiency. Regardless of the consequences, we must gear our production to the ever changing requirements of the men at the front—not to the convenience of those of us working safely at home."

Ascorbic Acid

ASCORBIC acid nutrition in workers in a large plant was found to be generally poor and somewhat poorer in lead workers than in others. Careful study of a large group of lead workers failed to reveal any effect of ascorbic acid taken orally in daily quantities of 100 mg. on the lead concentration in the blood or on the elimination of lead in the feces or urine. No difference was noted in the physical condition of the men or in the number and severity of complaints. No change was found in the number of erythrocytes or stippled erythrocytes or in the hemoglobin in the blood. No reason has been found for recommending the use of abscorbic acid to minimize the effects of lead absorption.

—Conclusion of "The Effects of Ascorbic Acid in Relation to Lead Absorption," by DRS. EVANS, NORWOOD, KEHOE, and MACHLE, in *J.A.M.A.*, February 13.

Ultra-violet Baths

FACTORIES all over England have found batteries of indoor "sunbaths" the means of insuring workers every chance of maintaining their health at peak. At Cadbury Brothers' works at Bournville, England, Dr. J. B. Sherman, the medical officer, made elaborate and careful tests on 1,635 employees with various methods of preventing colds. These showed that whereas the average absence due to colds amounts to 106 days per 100 workers, in the ultra-violet ray group this was lowered to 66 days per 100 persons. He concludes: "It was found that the only method of real value was ultra-violet irradiation, which reduces both the severity and the number of colds in patients so treated." From the Harland Engineering Company's works at Alloa come even more amazing figures. The firm's solarium in an underground first aid post is open to all. Since it was installed sickness has been reduced among the office staff by nearly 60% and among the works staff by over 35%. Guy Motors Ltd., of Wolverhampton, following two winters' experience giving sunrays to its employees, reported that last winter of those attending the daily treatments only 3% were absent through illness, while for those who had not attended, the sickness figures amounted to 10%. For treatments the maximum time any one is away from work is 10 minutes. In two years less than 1% of those taking treatments have discontinued them, once they have started.

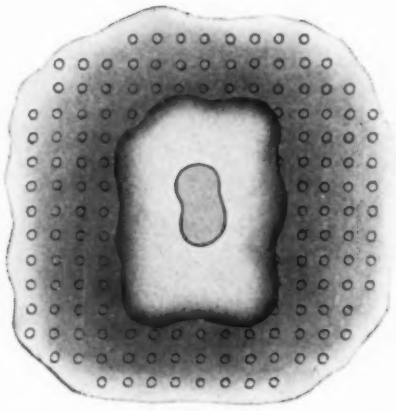
—Hanovia Chemicals & Mfg. Company Release.

Black Rings

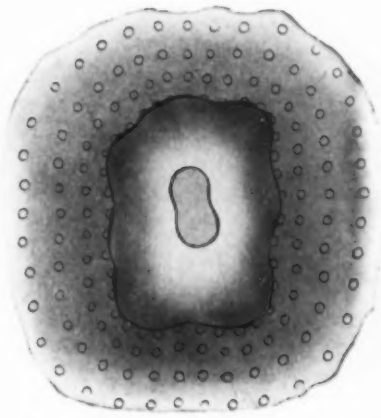
BLACK dermographism connotes the fact that under certain conditions a black line will appear at a skin site stroked with certain metals. Black dermographism not infrequently occurs in women wearing silver or cheap gold jewelry on powdered skin areas. Black dermographism is a physical phenomenon. The earlier theory that it is of some biologic or diagnostic significance is erroneous. Strictly speaking, the term "black dermographism" is a misnomer, since the reaction can be evoked not only on the skin but also on coarse paper, cloth and wood.

(Discussion): I thank the authors for clearing up many questions which I had about this condition in years past; it seems strange that it had not been reported previously in American literature. We meet this phenomenon in our clinical practice frequently. How often have most of

WHAT SURFACE TENSION MEANS TO AN ANTISEPTIC



Germicide which does not lower surface tension is slower to diffuse through cell wall. Molecules of germicide are distributed uniformly throughout the solution.



Ceepryn lowers surface tension, therefore diffuses through cell wall quicker. Molecules become concentrated about cell wall through adsorption, giving greater germicidal action.

An antiseptic with high surface tension does not enter skin crevices freely; therefore, its anti-bacterial action is limited to those organisms which are in readily accessible places.

The low surface tension of Ceepryn, however, enables it to flow freely into minute hiding places of bacterial organisms.

Another advantage of the low surface tension of Ceepryn is the ability of the antiseptic to penetrate readily the wall of the bacterial cell, which greatly steps up its germicidal action.

Moreover, the powerful detergent action of Ceepryn is valuable for its cleansing effect during antisepsis.

CEEPRYN

Brand of Cetylpyridinium Chloride

Low surface tension, high and non-selective antiseptic potency, and freedom from irritation to tissues combine to make Ceepryn one of the most widely useful agents in surgical preparation and treatment.

Ceepryn is offered in three forms, all reasonably priced:
Ceepryn Aqueous Solution 1:1000
—pints and gallons
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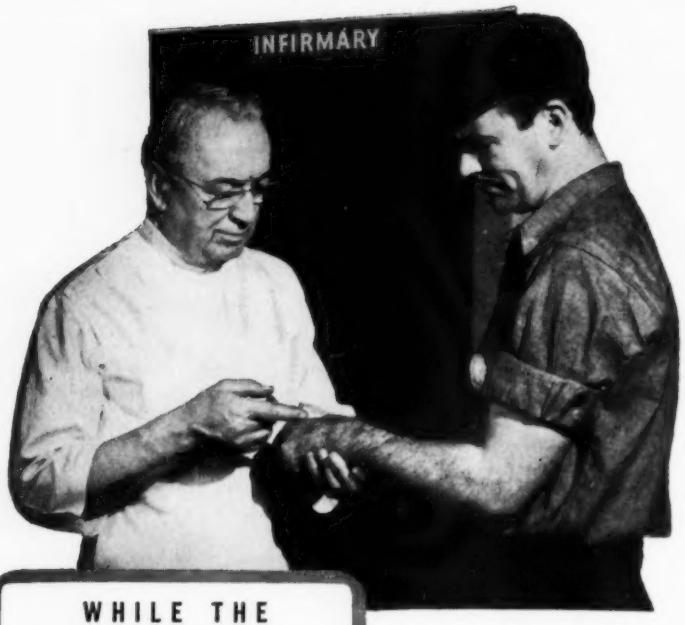

WHILE THE
IMMUNITY TO
DERMATOGENS
Develops

Experience has shown that immunity to many reagents employed in modern industry is quickly lost during vacations. On returning to work, susceptible employees frequently develop dermatoses which persist until protective antibodies are produced. During this period, Calmitol can prevent loss of valuable time. Its specific antipruritic influence quickly allays the discomfort of industrial dermatoses, and encourages resolution by its soothing, protective base and by overcoming the desire to scratch. A single application of Calmitol is usually effective for hours. Physicians are invited to send for samples.

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Calmitol exerts its antipruritic influence by blocking cutaneous receptor organs and nerve endings. Its active ingredients are chloriodo-camphoric aldehyde, levo-hyoscine oleinate, and menthol, incorporated in an alcohol-chloroform-ether vehicle. Calmitol is protective, bacteriostatic, and induces mild active hyperemia.

CALMITOL
THE DEPENDABLE ANTI-PRURITIC

us had patients come to us for some other condition and say "You know, I have too much acid in my system. All my rings are turning black on my skin." When they consulted me about what they should do about this, I was at a loss either to give them an explanation for the phenomenon or to offer any suggestions which might be of use. As has been pointed out, the term "dermographism" should be dropped, because we are not dealing with an urticarial phenomenon, and since the whole process is probably on a physical basis I have noted in a number of my patients that they do not always show this black writing on the skin under apparently similar conditions, such as wearing the same sort of jewelry and using the usual cosmetics and toilet soaps. In a number of cases the skin under wedding rings would turn black. This phenomenon occurred only at certain periods in their menstrual cycles. While I believe that this might be due to a difference in the dryness or moisture of the skin, this physical condition of the skin was influenced indirectly by the endocrines and therefore might then be said to be on a glandular basis.

—Summary of "The Phenomenon of Black Dermographism," by ERIC URBACH, M.D., and DONALD M. PILLSBURY, M.D., in *J.A.M.A.*, February 13; Discussion by SAMUEL M. PECK, M.D.

Anthrax

IT APPEARS to be impossible to destroy anthrax at its source. Sporadic cases of native origin will always occur. It is extremely difficult to disinfect hides and skins. The anthrax spore undoubtedly survives the first two or three processes in tanning—that is, washing, fleshing and liming—but probably cannot survive the entire process. No significant improvement in the method of killing anthrax spores has been evolved in the last 20 years; and even if it were possible to disinfect hides and skins, it is doubtful whether this would be warranted, especially at the present time. Therefore the method of control must be chiefly one of education and sanitary precaution until the hides have passed through the tanning process. The more severe cases and the most frequent deaths have occurred in truckmen and longshoremen, who are not aware of the possibilities of this infection and who neglect to report for treatment early. The prompt diagnosis and treatment in tannery workers seem in large measure responsible for the lessened mortality and morbidity among them. Physicians treating any cutaneous infection in a tannery worker or truckman should bear in mind the possibility of anthrax and should culture material from the lesion. In order to keep this disease in check effectively, an educational program must be directed toward truckmen, tannery workers, longshoremen and all others who handle imported hides, from their arrival in this country to their conversion into finished leather.

—From "Epidemiologic Aspects of Anthrax in Massachusetts," by IRVING R. TABERSHAW, M.D., and GEORGE E. MORRIS, M.D., in *New England J. Med.*, January, 21.

Kerato-conjunctivitis

BECAUSE epidemic kerato-conjunctivitis is a disease apparently new to continental United States, and because little definite information is available concerning its mode of spread, precautions should be taken to keep it under control. On the basis of the data which have been presented, the following recommendations are made: (1) Physicians should become familiar with the clinical picture of epidemic kerato-conjunctivitis, so that an early diagnosis can be made. (2) Meticulous cleanliness and disinfection of the hands of physicians and nurses who have come into contact with a case of epidemic kerato-conjunctivitis is indicated. (3) All instruments should be thoroughly sterilized, and individual droppers and glass rods should be used for each patient. (4) All solutions which can be so treated should be periodically boiled. (5) Strict isolation of patients with the disease should be effected as soon as possible. (6) All contacts of the patients should be observed for early signs of the disease.

—Recommendations from "Epidemic Kerato-conjunctivitis," by MURRAY SANDERS, M.D., F. D. GULLIVER, M.D., L. L. FORCHHEIMER, M.D., and R. C. ALEXANDER, M.S., in *J.A.M.A.*, January 23.

THE committee on Industrial Health of Illinois State Medical Society, Dr. Frederick W. Slobe, chairman, has distributed the following circular on epidemic kerato-conjunctivitis: "Since this ailment is already appearing in Illinois, prevention of its spread is important in order to minimize incapacity and absenteeism. The following is copied from Circular Letter Number 14, Office of the Surgeon General: The initial symptoms are those of acute

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USED EFFECTIVELY IN THE TREATMENT OF

Wounds, Burns, Ulcers, especially of the Leg, Intertrigo, Eczema, Tropical Ulcer, also in the Care of Infants

Desitin Ointment contains Cod-Liver Oil, Zinc Oxide, Petrolatum, Lanum and Talcum. The Cod-Liver Oil, subjected to a special treatment which produces *stabilization* of the Vitamins A and D and of the unsaturated fatty acids, forms the active constituent of the Desitin Preparations. The first among cod-liver oil products to possess unlimited keeping qualities, Desitin, in its various combinations, has rapidly gained prominence in all parts of the globe.

Desitin Ointment is absolutely non-irritant; it acts as an antiphlogistic, allays pain and itching; it stimulates granulation, favors epithelialisation and smooth cicatrisation. Under a Desitin dressing, necrotic tissue is quickly cast off; the dressing does not adhere to the wound and may therefore be changed without causing pain and without interfering with granulations already formed; it is not liquefied by the heat of the body nor in any way decomposed by wound secretions, urine, exudation or excrements.

DESITIN POWDER

Indications: Minor Burns, Exanthema, Dermatitis, Care of Infants, Care of the Feet, Massage and Sport purposes.

Desitin Powder is saturated with cod-liver oil and does not therefore deprive the skin of its natural fat as dusting powders commonly do. Desitin Powder contains Cod-Liver Oil, (with the maximum amounts of Vitamins and unsaturated fatty acids) Zinc Oxide and Talcum.

Professional literature and samples for Physicians' trial will be gladly sent upon request.

Sole Manufacturer and Distributor in U. S. A.

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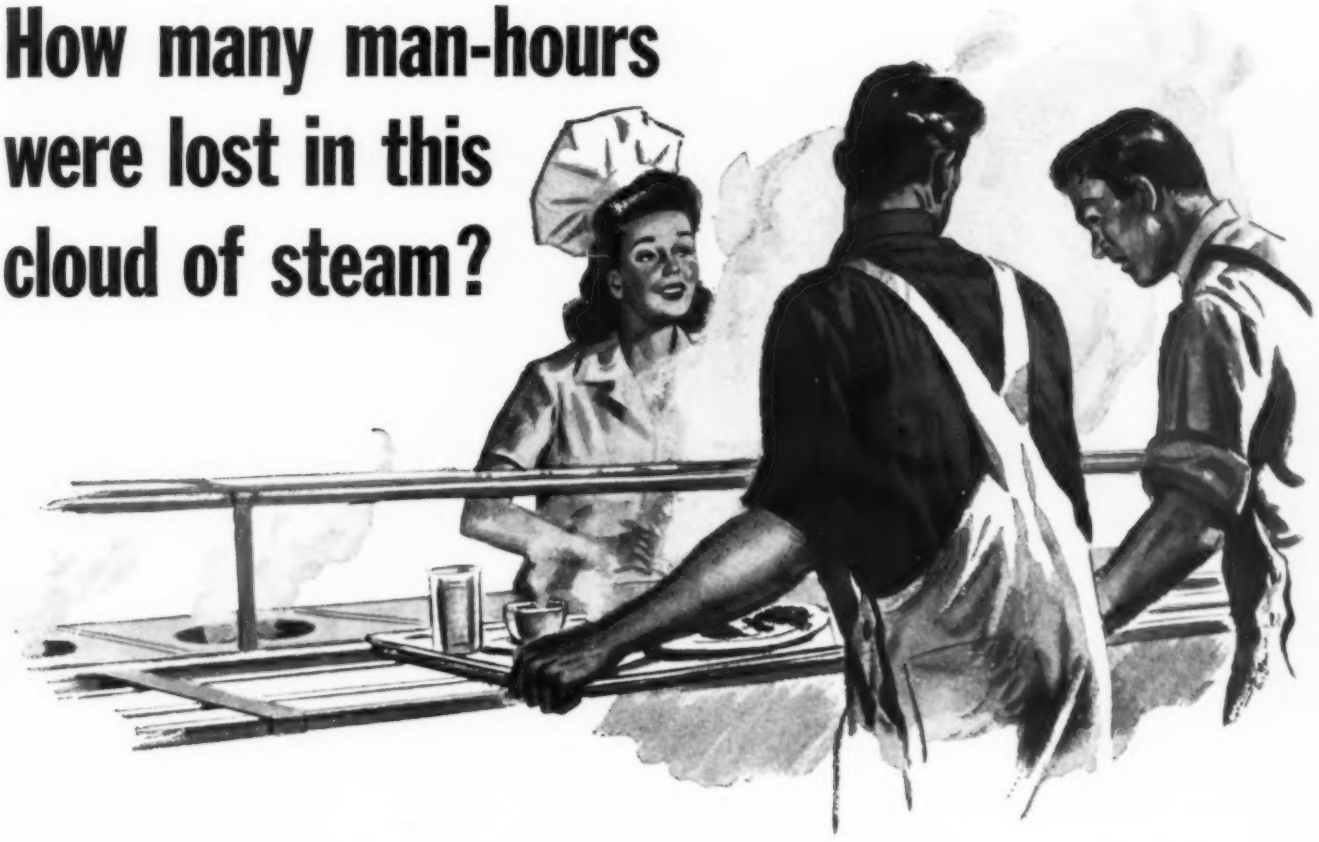
follicular conjunctivitis. In many cases the onset is sudden and severe. The conjunctivitis is characterized by "sandy feeling," as if a foreign body were present. Examination of the eye at this time discloses an extremely congested and chemotic conjunctiva, rather glassy in appearance, with sometimes concomitant edema of one or both lids, particularly the upper. Petechial or large conjunctival hemorrhage may occur. The conjunctivitis persists about two weeks. There is no discharge, although a transient pseudo-membrane may appear on the palpebral conjunctivas and caruncle. Systemic symptoms composed of headache and malaise occur shortly after the onset of the conjunctivitis in from 25 to 50% of the cases. The headache, a moderately severe, dull, aching pain over the frontal or occipital region, lasts two to three days and is apparently unrelieved by analgesics in most cases. It frequently prevents sleep and is often described as a "night pain." The malaise, when it occurs, varies in intensity with the severity of the conjunctivitis in most instances and is described as "not feeling well" or as having an "achy feeling." A preauricular adenitis appears in about 75% of the cases 36 to 48 hours after the onset of the conjunctivitis. The nodes usually measure 1 to 2 cm. in diameter, are tender and may remain enlarged from one week to several months. A keratitis appears about one week following the first symptoms of conjunctivitis. This is characterized by sudden pain, photophobia, lacrimation and blepharospasm. Close inspection of the eye at this time reveals dotlike opacities in the cornea. These gradually become larger and coalesce to form small round opacities from 0.5 to 1.5 mm. in diameter. The symptoms due to the onset of the keratitis usually last about one week but in some cases persist for two to six weeks. With the appearance of the keratitis the visual acuity is definitely diminished. Patients sometimes complain of seeing halos around objects. Precision work at this time is almost always impossible. A 20/30 vision is usually regained in some three to six weeks and the ultimate prognosis as to vision is good. The disease is self limited, usually lasting from one to three months but sometimes much longer. The corneal opacities do not ulcerate, gradually diminish in size, and in most cases finally disappear. In some severe cases, however, damage to the cornea causes a permanent impairment of vision. The early recognition and prevention of spread of this disease are particularly important because of its high non-effective rate. Precautionary measures which should be carried out consist in: (1) Isolation of the patient during the acute stage of the disease, if practicable. Patients should have no access to towels, soap or washstands used by others. Where a small number of cases occurs, strict isolation is desirable. (2) Careful supervision of patients with irritated eyes, chalazions and traumatic lesions of the eye which render them more susceptible to kerato-conjunctivitis. (3) Advice to the patients that this disease may be transmitted by hands, towels, handkerchiefs and other fomites that have been in contact with the infected eye. (4) Thorough washing of the hands after examination of a suspected patient and before examination of other patients. (5) Sterilization of solutions, eye droppers and instruments used in eye cases. It is particularly important for the responsible medical officer to see that the fourth and fifth precautionary measures just mentioned are observed, since the dispensary can become the focus for the distribution of kerato-conjunctivitis to patients who otherwise would not be exposed. These cases should be reported to the local and state Health Departments."

STRIKING clinical improvement" in nine out of 10 patients suffering with "shipyard eye" has been achieved by injections into the veins of blood serum from other patients already recovering from the eye condition, is reported by DR. ALSON E. BRADLEY and DR. MURRAY SANDERS, of New York, in *J.A.M.A.* (March 29, 1943, pp. 999). The group of cases treated is small and further studies with control cases are needed before convalescent serum can be accepted as a cure for the condition. However, since this ailment is occurring in epidemics in industrial areas in many parts of the country, and since no other treatment has materially shortened the course of the disease, it is felt that attention should be called to the possibilities of convalescent serum treatment. Seven of the 10 patients were "clinically

How many man-hours were lost in this cloud of steam?



STEAM TABLES are one more hazard for the 3 out of 4 Americans who are undernourished—an easy prey to the minor ills which cost industry 24 million man-hours each month. Food snatched from the cafeteria line and rushed to the laboratory for analysis has been found to lack up to 90% of its original vitamin content.

Thus, even if workers choose the right foods, they may be robbed of the nutritional content that food should contain. And most of them *do not* choose the right foods. Even before these days of food shortages, surveys[1] showed that 71% of our war workers were living on inadequate diets.

What is the answer?

Dietary supplementation offers a way to *make sure* your workers get all the vitamins and minerals they may need. Plants and offices that have tried this method report less absenteeism, fewer colds, less fatigue, and improved efficiency.

Vimms . . . A Balanced Supplement

In recommending a dietary supplement, many doctors prefer Vimms. Here's why:

Vimms are complete. They supply *all* the vitamins known to be essential in the full daily minimum amounts recommended by the Government.[2] In addition, they supply generous quantities of all the essential minerals. (See chart.)

Vimms are balanced. Medical councils have established the proper ratios for compounding supplements. Vimms are correctly balanced in these ratios.[3]

Vimms are tested. Vimms potencies are chemically and biologically controlled by the best-known vitamin assay laboratories. Exhaustive tests insure the stability of the vitamins and minerals in Vimms.

Vimms are palatable, low in cost. 50¢ for 24 tablets; $1.75 for 96 tablets; $5.00 for 288 tablets. And most important of all, three Vimms a day will *make up the difference* between what your average worker gets in his regular meals and the vitamin-mineral levels he should attain for top-notch working efficiency.

If you wish clinical samples of Vimms, please write Lever Brothers Co., Dept. IM-6, Pharmaceutical Div., Cambridge, Mass. (Offer good in U. S. A. only.)

[1] The Food and Nutrition of Industrial Workers in Wartime
[2] Food and Drug Administration
[3] Journal of the A. M. A., July 18, 1942; pp. 948-9

VIMMS MEET OR EXCEED MEDICAL RECOMMENDATIONS*

Medical recommendations are based on these Gov't standards	VITAMIN	See how 3 Vimms meet or exceed these standards
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1.0 Milligram	B_1	1.0 Milligram
2 Milligrams	B_2(G)	2 Milligrams
30 Milligrams	C	30 Milligrams
400 USP Units	D	500 USP Units
10 Milligrams	P-P (Niacin Amide)	10 Milligrams

In addition, Vimms supply these vital minerals:

CALCIUM	375 Milligrams
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IRON	10 Milligrams

*Jour. of the A. M. A., July 18, 1942, pp. 948-9

Vimms

All the vitamins *known to be essential*

All the minerals *commonly lacking in the diet*

YOUR PATIENTS FIND IT JUST AS EASY

In less than 1 minute you, your technician or any of your patients can make a reliable, qualitative urine-sugar test with

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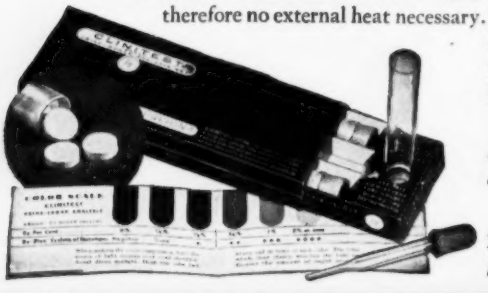
OTHER OBVIOUS ADVANTAGES: CLINITEST Tablets generate own heat; therefore no external heat necessary. Each tablet contains an accurately measured amount of reagent; therefore no weighing of reagents, no liquids to spill, no delay.



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cured," six of them in 48 hours. In two others the normal course of the disease was shortened and corneal changes possibly aborted. One case is classed as a failure because adequate information following treatment could not be obtained.

—*Science*, April 2, 1943.

Indiana

INDIANA has been chosen as a proving ground to demonstrate what civilian physicians can do to advance the cause of industrial medicine. The Indiana State Medical Association, in cooperation with A.M.A., has developed a plan to train doctors for service in war industries. It will be recalled that the Indiana Association was the first in the country to suggest a definite program for the mobilization of medical resources for war. This idea subsequently was adopted by the A.M.A. and became the pattern for other states. The Indiana experiment was opened with a two-day industrial health conference in Indianapolis, February 25 and 26. Talks were made by nationally known physicians, lawyers, personnel directors and labor leaders. The state board of health, Indiana University School of Medicine, Indiana State Chamber of Commerce and Indiana procurement and assignment service also were represented. (*Indianapolis News.*) "During the war emergency it has become more important than ever to maintain the health of the industrial workers," declared DR. EDWARD C. HOLMBLAD, Chicago, in the keynote address of the conference. "Our paramount problem now is to win the war and to keep the people of our nation in the best possible health. Industry has a proper place for every worker and our job is to try to find that job for him according to his abilities. During the last 40 years the study and practice of medicine in industrial plants has become a specialty." The technique of examining prospective employees was explained in detail by DR. FRED B. WISHARD, of Anderson, industrial physician, Delco-Remy Division, General Motors. He emphasized the importance of a thorough examination of the worker, both for his protection and that of the employer. DR. GEORGE S. BOND, heart specialist, said there are on record 3,000,000 heart conditions in adult males of employable age. "There is no reason why some of these persons should not be employed, provided they are given work of less physical exertion, the type of jobs which they can handle, and which will not jeopardize the safety of fellow employees." In reporting absenteeism from war plants, A. T. COURT, of Detroit, of General Motors, said that young men are the worst violators, with older women next. Young women are the least absent. Physically handicapped have a better record than those not so handicapped. He has found that visiting nurses and "social counselors" who talk over personal problems with the employees are a great help in keeping workers on the job. DR. M. H. KRONENBERG, of Chicago, asserted the problem of health among women workers is not one of "an endurance test." He recommended that employment managers see that they "tailor the job," have smaller tools, be careful of weight lifting, see that chairs are small enough, that clothes are suitable, and that there are frequent rest periods. The control of tuberculosis in industry was reported by DR. A. G. KAMMER, Inland Steel Company, East Chicago, and that of syphilis by DR. H. A. VONACHEN, of Caterpillar Tractor Company, Peoria. "Skin diseases cause the greatest number of cases of absenteeism of any of the industrial diseases," declared LIEUTENANT COMMANDER SAMUEL M. PECK, Bethesda, of the U. S. Public Health Service. LIEUTENANT COMMANDER J. J. BLOOMFIELD, chief of the states' relations section, Division of Industrial Hygiene, U. S. Public Health Service, outlined the excessive responsibilities of industrial hygiene now facing the nation. "Time losses are 15 times as high from your non-occupational causes as from occupation causes and disease combined," he asserted. DR. CLARENCE D. SELBY, medical consultant, General Motors, and chairman of the procurement and assignment service of the War Manpower Commission, assured that, although there is a desperate need for physicians in industry, in no way will the standards of the medical profession be sacrificed. "This is a tough war, and it's going to take all we have to win it. The ability of the worker to stay on the job is necessary to win it, and the industrial physician must help to keep him there." (*Indianapolis Star.*)

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JACK & HEINTZ," by ROBERT COUGHLAN, in *Life*, March 22, contains the following: "Most up-from-the-ranks executives probably would subscribe to this idea, at least in theory. In Bill Jack's hands, however, it has resulted in a managerial technique that embodies many of the qualities of college football, a health farm, Moore's Utopia, a revival meeting and bingo. After a week or two in this atmosphere, the average new Jack & Heintz worker has the ecstatic, somewhat stunned look of a Father Divine follower. In this interval he has been told that he is not an employee, but an 'associate.' He has been given a complete physical examination, including a full-mouth x-ray, and his bad teeth have been pulled or filled. He has a $2,500 life insurance policy covering his family, and a minimum guarantee of $25 a week in benefits for eight weeks if he gets sick. He has a new pair of comfort shoes worth $15, and two sets of coveralls with his first name embroidered over the right breast and 'Jahco' over the heart. Laundry service, like everything else, is free. He has been eating a nutritious hot lunch every day in a plant cafeteria and topping it off with a packet of high-test vitamin pills. In the plant he can amble over any time and have a cup of coffee and a couple of doughnuts on the house. He has his own coffee cup, with his name embossed on it. If he gets tired he is encouraged to stop work and go to the steam room for a Turkish bath and massage. If, after a few months, he feels the need of sunshine and a real rest, he and his wife can take a free two-week vacation either at Honeymoon Isle, an exotic resort off the west coast of Florida, or in summer at Harbor Island, in Lake Huron's Georgian Bay."

CAFETERIA absenteeism" was served up today as a new chiseling device of government employees. Representative Robert Ramspeck (D), of Georgia, chairman of the House civil service committee, declared that "loafing" in eating establishments by government workers is costing "at least a million dollars in Washington alone" and wasting thousands of man-hours. A survey of 10 government agencies by a committee investigator disclosed that almost 3,500 employees jammed cafeterias daily between 9:00 and 10:00 A.M. Officials of the Department of Agriculture did not mind employees going out for a "coke" or cup of coffee, Anthony Williams, of that agency's personnel council admitted. He asserted coffee was available any hour of the day in each of the six cafeterias. This caused Representative Charles M. LaFollette (R), of Indiana, to declare that in a shipyard in Indiana the navy was unable to get even a coffee allotment for war workers "toiling out in the cold." Responsibility for cafeteria absenteeism was placed on the shoulders of supervisors by government agency spokesmen.

NUMEROUS INDUSTRIALISTS who have appeared privately before the Truman committee have told the senators that talk of absenteeism is mostly smoke, with very little fire. They say, in effect: "We hear a lot about absenteeism and we read a lot about it in the papers, but it is no great problem in our plants." Such interference as does exist, they say, could be minimized if more employers followed the example of one of their number. He sharply reduced absenteeism by installing a barber and beauty shop and a small store, where employees could buy such essentials as soap and prepared foods, right at the factory.

—News Item.

AMONG the important articles of the month is the carefully prepared study of "Toxic Dusts, Fumes and Gases in Industry" by DR. GEORGE E. MORRIS, physician, Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, in *New England J. Med.*, March 18.

THE current speaking engagements of DR. C. O. SAPPINGTON, editor of INDUSTRIAL MEDICINE, include the following: *April 6*—Address before the Academy of Medicine, Toronto, Canada: "Industrial Health." *April 15*—Address at the combined meeting of Englewood and Stock Yards Branches of Chicago Medical Society: "Present Day Problems in Industrial Health and Hygiene." *April 29* — Western Pennsylvania Safety Conference, Pittsburgh: "Fatigue as a Factor in Accidents and Illness." *May 6*—Midwest Safety Congress, Chicago: "Industrial Health During and After the War."

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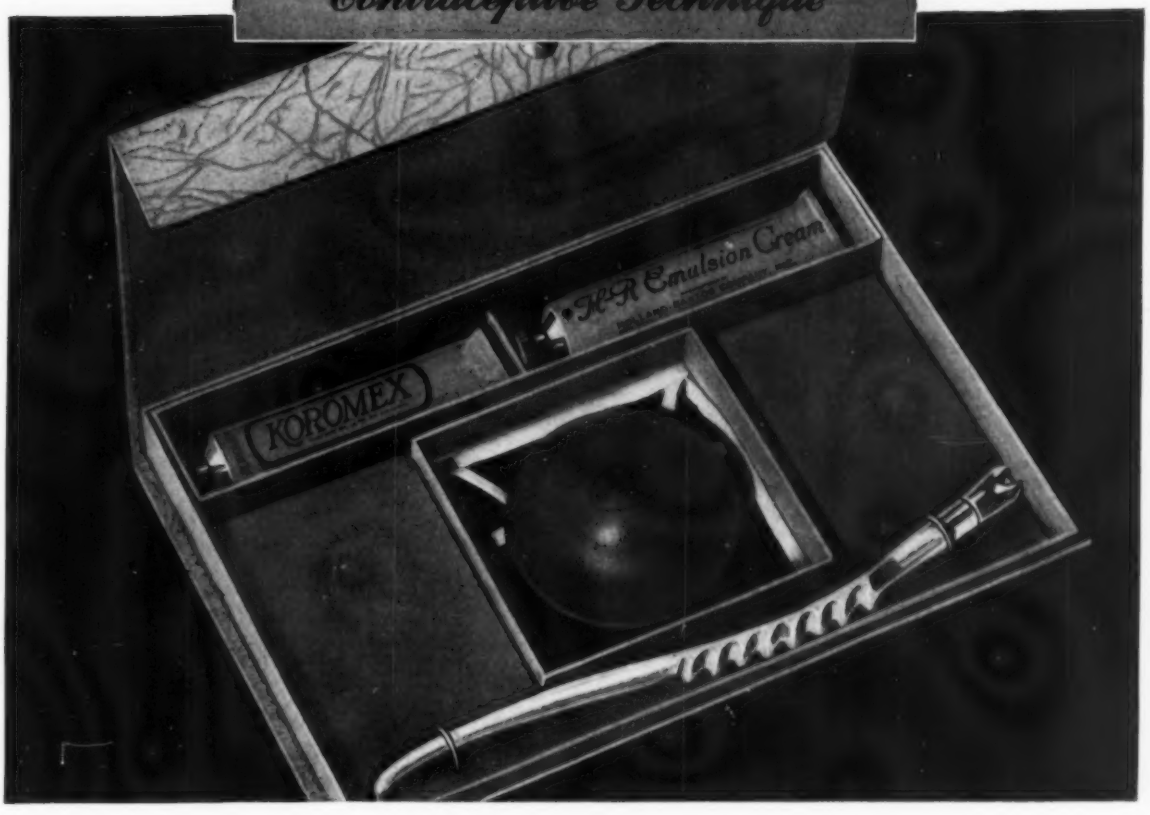

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THE writer lays no claim to the power of prophesy but in view of the rapid development of industrial medicine in the last 50 years from the simple application of well understood treatment of minor injuries to its present extremely complicated and highly complex specialization, it would seem obvious that the effectiveness of this type of medical practice will continue to grow and become an ever increasing force for the protection of employees and the detection of disease in its earliest stages, and by this example exert profound influence on the public health. For the increased effectiveness of such a program it might be well that certain changes be made in our present compensation law to allow for the placing of employees with correctible or minor defects in industry without penalty on the employer and for the removal of too frequent cause of controversy and dispute in the awards granted following occupational injuries or diseases. Under the present system the awards are often determined by lay juries, usually after conflicting medical testimony. It is impossible, in my judgment, for lay juries to assay such testimony, and it is my opinion that more equitable awards could be rendered by having this testimony given before an expert accident board, composed of a certain number of doctors, or having such doctors constantly in their employ. It is my feeling that this would shorten the period between the accident and the rendering of the final award, which is the result of the necessary delay on the part of the courts in reaching a verdict and hearing all appeals.

—From "The Growth of Industrial Medicine as a Force in Public Health," by HERBERT F. POYNER, M.D., in *Texas State J. Med.*, January.

Illinois

HEALTH of industrial workers was the conference subject at La Salle, Illinois, Thursday, April 8, under the auspices of the Medical Societies of La Salle and Bureau counties and the Illinois Valley Manufacturers Club. DR. J. L. ROCK, of La Salle County Industrial Health Committee, presided; DR. M. H. KRONENBERG gave "The Objectives of the Conference"; DR. PAUL A. BREHM, Madison, Wisconsin, spoke on "Absenteeism in Industry — Its Causes and Control"; DR. O. A. SANDER, Milwaukee, presented "Tuberculosis in Industry"; and DR. EDWARD C. HOLMBLAD, of Chicago, told "How the Small Plant Can Conduct a Health Program." At the dinner meeting in the evening, with DR. O. C. YODER, president of the La Salle county Medical Society, presiding, HARRY GUILBERT, of Chicago, spoke on "A New Era for Health and Safety in Industry," and DR. CHAUNCEY C. MAHER, of Chicago, asked "What About the Health of the Executive? — Is His Heart Next?"

Michigan

MICHIGAN State Medical Society industrial health committee and the department of post-graduate medical education, University of Michigan, cooperated in a post-graduate industrial medical and surgical conference held at the Horace H. Rackham Memorial, Detroit, April 8, with the following program:

"Study on Minor Burns" — DR. ROY D. MCCLURE, Detroit.

"The Employment of Women in Industry" —DR. MAX R. BURNELL, Flint.

"Industrial Hygiene in the War Industries"—J. J. BLOOMFIELD, Bethesda.

"Industrial Illness and Disability Analysis" —ANDREW T. COURT, Labor Economics Section, General Motors, Detroit.

"Heart Disease in Industry"—DR. HERMAN H. RIECKER, Ann Arbor.

"Dermatitis in Industry" — DR. LOUIS SCHWARTZ, Bethesda.

"Management of the More Common Industrial Fractures"—DR. BARNEY J. HEIN, Toledo, Ohio.

"Traumatic Eye Injuries and Epidemic Kerato-conjunctivitis"—DR. PARKER HEATH, Detroit.

"Back Injuries—Medical Legal Complications"—DR. CARL E. BADGLEY, Ann Arbor.

"Mental and Psychological Problems Relative to Industrial Employment"—DR. FRANK F. TALLMAN, Lansing.

"The Employment and the Evaluation of the Handicapped Worker in Industry"—E. P. CHESTER, director, bureau of rehabilitation service, State Department of Education, Hartford, Connecticut.

"Medicolegal Phases of Industrial Employment"—L. J. CAREY, general counsel, Michigan Mutual Liability Insurance Company, Detroit.

"Viewpoint of the Michigan Department of Labor and Industry" — JOHN W. GIBSON, chairman, Michigan Department of Labor and Industry, Lansing.

Missouri

DR. E. P. HELLER, president, KANSAS CITY ASSOCIATION OF RAILWAY AND INDUSTRIAL PHYSICIANS AND SURGEONS, and Chairman, Jackson County Medical Society Committee on Industrial, Contract and Insurance Practice, presided, March 17,

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at a symposium on "What Should Be Done to Improve the Health Program and the Medical Care of the Worker," held at the Muehlebach Hotel, Kansas City, Missouri. This was the first of a series on industrial health contemplated for the Greater Kansas City Area, sponsored jointly by the KANSAS CITY ASSOCIATION OF RAILWAY AND INDUSTRIAL PHYSICIANS AND SURGEONS; the Committees on Industrial, Contract and Insurance Practice of the Jackson county and Clay county Medical Societies, the Kansas City Area Industrial Hygiene Service; the Kansas City Southwest Clinical Society; and the Committee for Public Health and Welfare, Chamber of Commerce. On the program the subject of "Labor" was discussed by H. FREMMING, regional director, C.I.O., and P. MCELROY, executive secretary, A.F.L.; "Management" by H. DORR, resident manager, Lake City Ordnance (Remington Arms Corporation); "Public Health" by DR. N. MILLMAN, Ass't Surgeon, U. S. Public Health Service; "Industrial Nurses" by MISS MARY FLAHERTY, R.N., president, Kansas City Industrial Nurses Association; "Industrial Physicians" by DR. F. FEIERABEND, chairman, Committee J.C.M.S. Pre-paid Medical Care; and "Compensation Board" by R. COHN, Missouri State Workman's Compensation Board; with a concluding "Summary" by DR. C. D. SELBY, medical consultant, General Motors, Detroit.

CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY and CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY will hold their annual meetings jointly, at the Palmer House, Chicago, May 18, 1943, in conjunction with the Illinois State Medical Society Convention. The forenoon program will be devoted to industrial health, with DR. C. O. SAPPINGTON, president of Central States, and DR. CLARENCE W. HENNAN, president of the Chicago Society, presiding. The program has been arranged by DR. JAMES J. CALLAHAN and DR. THOMAS E. BROWNING, program chairmen. Following the address of welcome by DR. CLARENCE W. HENNAN, president of the Chicago Society, STERLING MORTON, president of the Illinois Manufacturers Association, will talk on "Industrial Health and the Employer"; JAMES CROSSER, chief chemist, Industrial Hygiene Division, Illinois State Department of Labor, will talk on "Labor's Attitude on Industrial Health"; and DR. HAROLD A. VONACHEN, general medical director, Caterpillar Tractor Company, Peoria, will present "Industrial Health and the Industrial Physician." The Central States' president's address by DR. C. O. SAPPINGTON will be on "Industrial Health—Its War and Postwar Significance." The morning session will be rounded out by a general discussion. In the afternoon, under the chairmanship of DR. R. W. MCNEALY, of Chicago, the two industrial societies will hold a joint meeting with the Surgical Section of the Illinois State Medical Society.

Massachusetts

THE annual Massachusetts Safety Conference on War Production and Civilian Defense, at Boston March 29 and 30, had two programs of industrial medical interest which included the following subjects:

WORKER Health in Wartime"—LOUIS R. DANIELS, M.D., medical director, Hood Rubber Company, presiding:

"Chlorinated Solvents in Common Wartime Use"—DOHRMAN H. BYERS, chemist, Massachusetts Division of Occupational Hygiene.

"Food for Production"—QUINDARA OLIVER DODGE, chairman, Subcommittee on Industrial Nutrition, Massachusetts Committee on Public Safety.

"Safeguarding the Radium Dial Painter"—ROBLEY D. EVANS, associate professor of physics, Massachusetts Institute of Technology.

MEDICAL Service in Wartime Industry"—THOMAS L. SHIPMAN, M.D., works physician, General Electric Company, Lynn Works, presiding:

"Coronary Heart Disease—Its Threat to Industry"—PAUL D. WHITE, M.D., Massachusetts General Hospital.

"The War Worker's Most Common Affliction—Dermatitis"—GEORGE E. MORRIS, M.D., physician, Massachusetts Division of Occupational Hygiene.

"What is IV-F in Industry?"—DANIEL L. LYNCH, M.D., medical director, New England Telephone and Telegraph Company.

WISCONSIN Medical Society Council on Scientific Work, in cooperation with the society's Committee on Industrial Health and the Industrial Hygiene Unit of the State Board of Health, has arranged a second Post-graduate Industrial Medical and Surgical Clinic, to be held

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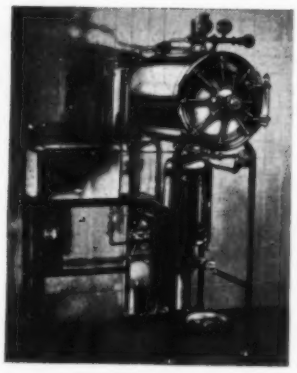

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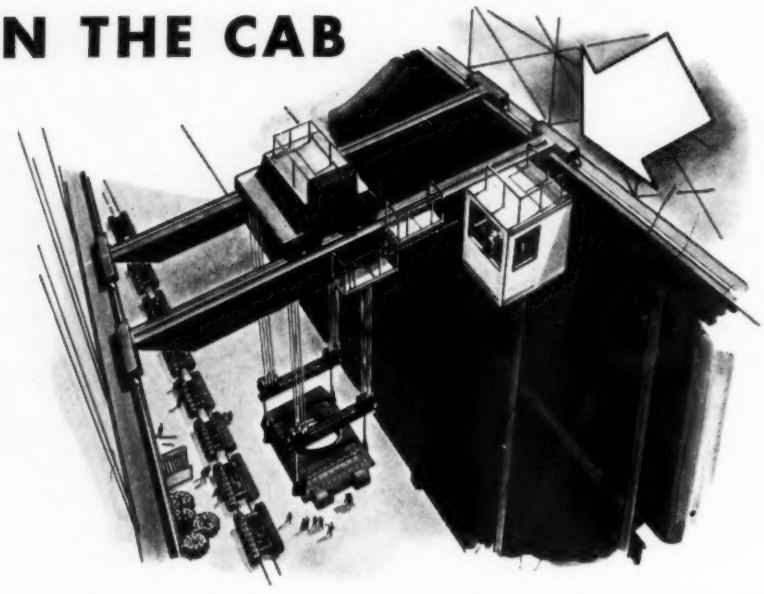
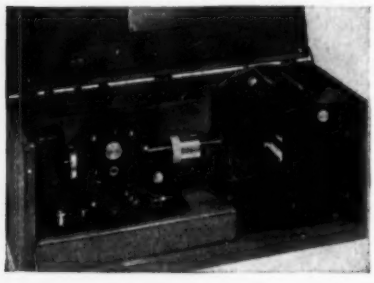


There are many tasks in industry upon which men with cardiovascular diseases should not be employed. The assignment of workers to the jobs of men called away by Uncle Sam, has made physical fitness a problem of vital importance.

Nor is the strain of war confined to the hearts of labor alone. Executives too, are under terrific pressure and must be kept fit. Today more than ever, the Cardiologist is playing an important role on the home front. Periodical physical examinations, complete with electrocardiograms, are all-essential.



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at Loraine Hotel in Madison, Wednesday, May 5, and at Conway Hotel, Appleton, May 6. DR. ERWIN SCHMIDT, Chairman of the Council on Scientific Work, has arranged the following program: "Dermatoses in Industry"; "Fracture Motion Picture Film"; "Late Development in the Treatment of Burns"; "Sulfonamides and the Treatment of Wounds"; "Clinical Concept of Shock and Its Treatment"; "Virus Pneumonia in the Army and Its Relation to Industry"; "Pros and Cons for the Routine Immunization of the Industrial Workers Against Tetanus"; "Why Do Fractures Head the List of the Causes of Disabilities?"; "How Can Fracture Disabilities be Reduced?"; Round Tables: Dermatoses in Industry; Treatment of Burns; Respiratory Infections; Common Industrial Fractures; War Gases; Industrial Hand Infections and Accidents; The Placement Examination; "Gas Used in Warfare"; "Diagnosis and Treatment of Gas Casualties"; "New Medical Problems War Industry Has Brought to Wisconsin"; "Common Colds and War Efficiency"; "Health Problems Provoked by Employment of Women in Industry"; "Placement Examinations"; "The Problem of Employing the Physically Handicapped and Aged"; "Accidents Peculiar to Agricultural Industry"; "The Nurse in Industry"; "Health Education of Employees: Facilities and Procedures"; "Value of Mid-morning and Mid-afternoon Lunches"; "Optimum Hours of Work—Fatigue in Relation to Production"; "Wisconsin Workmen's Compensation Act"; "Employee Viewpoint"; "Actual Demonstration of Placement Physician Examination"; "The Safeguarding of Industrial Health by Industry and Medicine"; "Optimum Hours of Work"; "Why Do Employees Stay at Home, and What Can Be Done About It?"

Pennsylvania

PENNSYLVANIA MED. J., February, 1943, has an interesting section on industrial health. The introduction says, "Avoiding as much as possible confusion with the work of industrial surgeons employed by industry to treat compensation injuries, the physicians of Pennsylvania are now joining with management and labor, with chambers of commerce, and with insurance carriers to aid in the reduction of employee absenteeism due to preventable illness. To lead in such a movement is to make an important contribution toward the winning of the war by the members of the medical profession. To the end that success may be achieved in the second largest industrial state of the Union, the Medical Society of the State and its 60 component county medical societies have undertaken the state-wide program, county by county, as outlined and enlarged upon in the first 13 pages of this issue of the *Journal*." The activities of the Lycoming, Philadelphia, Allegheny, Lancaster, and Dauphin county societies are given special mention. The state medical society has a Commission on Industrial Health and Hygiene, of which DR. CHARLES-FRANCIS LONG is chairman and DRS. JOHN R. CONOVER and JOHN P. HARLEY are co-chairmen. The commission has an outline of advice to county committees on industrial health and hygiene, with a comment on the Lycoming county industrial health plan now in successful operation. Then follow three contributions by the chairman and his co-chairmen on industrial health and hygiene. These are "Objectives of Organized Medicine in Industrial Health and Hygiene," "Medical and Non-Medical Problems in Industrial Health and Hygiene," and "Methods of Accomplishing Our Objectives." The feature articles include "Important Factors in Industrial Preventive Medicine," by DR. JOHN H. FOULGER, "Conservation of Manpower," by DR. C. RICHARD WALMER, "The Role of Fatigue in Industry," by DR. GEORGE MORRIS PIERSOL, and "Vitanition," by DR. HERBERT M. FRIEDLANDER. The late February, March, and early April lectures of the graduate course in industrial medicine at the department of industrial hygiene, School of Medicine, University of Pittsburgh are listed, together with the late February lecture subjects in the post-graduate course in industrial medicine and hygiene at Philadelphia.

—Continued on page 252.

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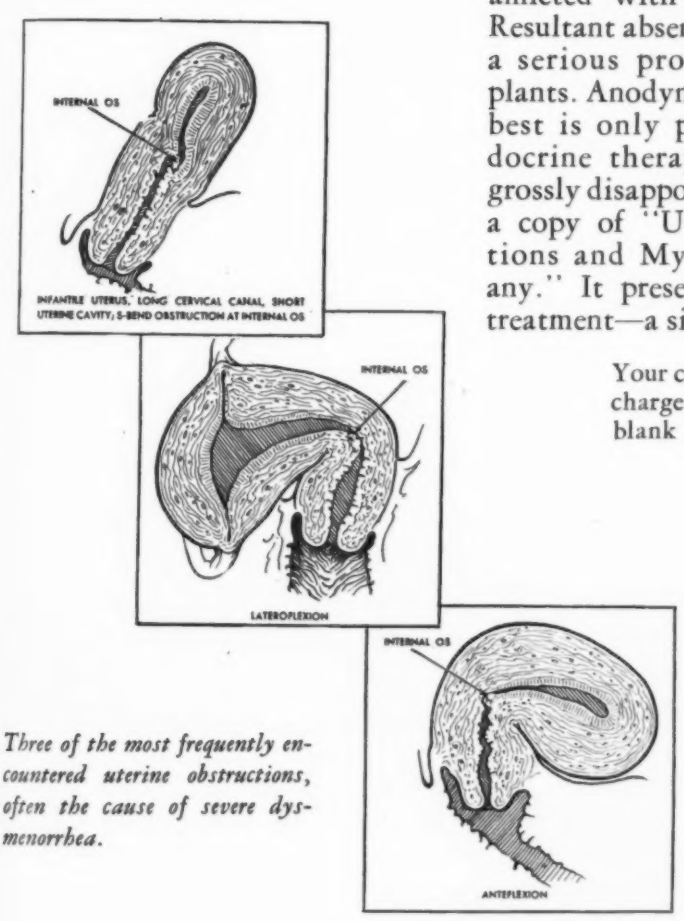

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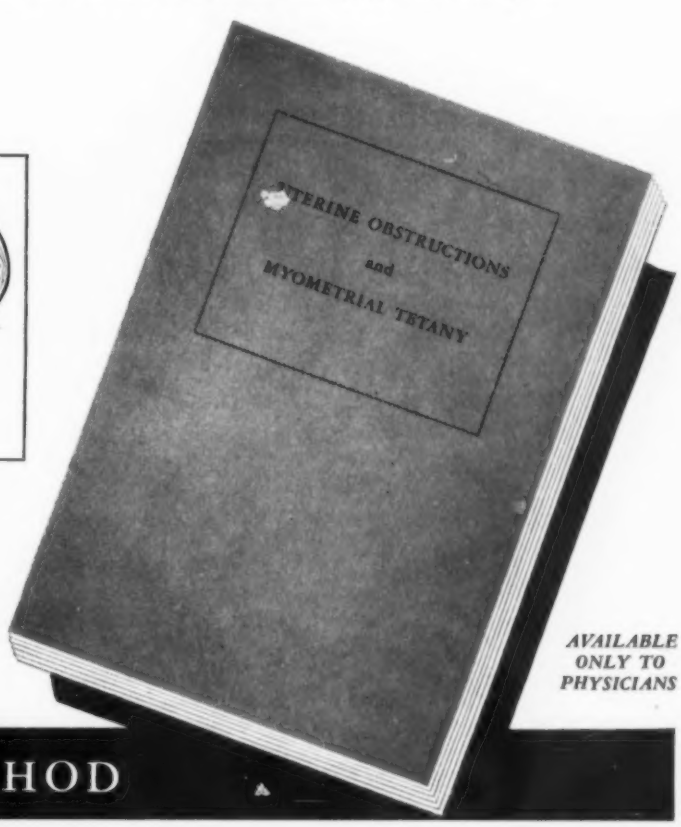

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Industrial Medicine

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A Psychiatrist Looks at Industrial Truancy

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NO MORE striking illustration of the advances that psychiatry has made in evaluating human conduct can be found than in a consideration of the current problem of "absenteeism" in industry. All of the attempts of management, of labor, of government, of the press, and of many other agencies fail to reveal any technique to improve the situation. Most of these attempts are either punitive or exhortative—two methods of dealing with behavior problems, which, in dealing with the criminal, the problem child, or the maladjusted adult, have proved to be so inadequate that the services of psychiatry have been called in with, in many cases, dramatic results.

It is impossible to hope that psychiatry can more than point out a few approaches in the present problem, for psychiatrists are spread thin already by the demands of the armed services and of the mentally sick in the community. The writer has previously emphasized the need for more industrial psychiatry and suggested means of doing psychiatry even during a shortage of these specialists.[15] It is to be hoped, therefore, that the present attack upon the problem of absenteeism may point out some mental health procedures which could be applied by the plant physician and his right arm, the personnel manager, with perhaps consultant advice from such organizations as the state mental health councils or consulting psychiatrists employed by the plants.

The Psychiatric Approach to Industrial Truancy

THE psychiatric approach to this subject is necessarily as different from the usual cumbersome approach to labor problems by government as the psychiatric treatment of the criminal is from the indiscriminate incarceration of offenders and the mass hanging of even minor offenders during the nineteenth century. The approach is necessarily first preventive and, second, one of individual treatment for individual offenders.

The impression extant in labor research circles seems to be that less than 20% of employees constitute 100% of the chronic absentees. Yet, all those who are chronically absent are not necessarily truant, and it is well to consider the diagnosis and treatment of the problem as one of preventing and curing truancy rather than absenteeism as a whole. An industrial physician can take care of those who are away from work for reasons of illness. The safety director is in a position to do a great deal in preventing absence due to accidents, although Canty and I[16] have shown that psychiatry renders a major service in accident prevention also. The personnel man is in a position to place the incompetent or mildly incompetent worker in a job where he can express himself most fully, and the production manager, so far as he can within governmental limitations, is in a position to prevent absenteeism which is found in relationship to production changes, layoffs, and faulty plant routine.

The truant is specifically a medical personnel problem. Among the truants we must include some of those who seem to be justifiably absent but in whose cases are found elements which could be eliminated to keep the man on the job. These elements are largely social in nature, such as conflict in the home, illness in the home of married women workers, transportation breakdowns due to the man's indifference about the equipment that he uses to take him to work. But the truant presents another problem, one in emotional maladjustment. It is he, I am sure, although there can be no figures on the subject, whose problems must be handled with understanding, care, and skill in order to prevent a shutdown of large amounts of equipment in essential industries so that our war production may reach a maximum and hold that maximum consistently.

I cannot hold with the War Production Board's classification of "excusable," "preventable," and "inexcusable" absences. I feel that from the psychiatric standpoint, i. e., from the standpoint of preventing these absences, these categories overlap. For instance, a man who has chronic "stomach trouble" so that he vomits, is weak and has to lie down all day in order to get his strength back may be considered ill from a stomach ailment and therefore excusably absent, but this stomach ailment may be mental in nature and he may be reacting to an unpleasant plant situation, such as teasing by fellow workers, an inadequate diet because of food fads, or an antagonistic supervision, and this situation expresses itself in physical symptoms.

By the same token, the man who says, "I just couldn't come to work; I was too tired," or "I didn't feel like coming to work," may be reacting to a very definite physical ailment. As the writer has pointed out,[15] with the culling of the young, healthy individuals the shallow labor pool is forcing more women and more

From the Psychopathic Clinic of Recorder's Court, Detroit, Michigan, Series I. No. 2.

physically and mentally unsound persons into plants. Psychological factors have a deeper effect on these individuals, and the mere feeling that they cannot come to work and face the mental problem may be as inhibiting as a sprained wrist.

For this reason, statistics about absenteeism reveal little about truancy. The reason expressed by a truant may, first, be false, but in a large number of cases the plant cannot spend the time or the personnel to lead him into telling the truthful reason for his absence. Second, the explanation may well represent a *rationalization*, a psychiatric reaction which results in the reason given for an act or a thought being one which is socially acceptable and which the man really believes to be true, but which, upon careful psychological analysis, does not represent the true cause at all. This type of explanation is found frequently among delinquent boys who say that they were forced to commit an offense and in whose cases careful psychological study reveals the hatred of an abusive father was transferred in the boy's mind to all persons in authority, so that the crime was committed to upset the police and, indirectly, the hated father.

Rationalization among workmen, in my experience, is very common. Sometimes it is not purely emotional in origin, as, for instance, a man may say that he was sick because he feels physically rundown, but instead he is reacting to the boredom of an extended work week and rather monotonous employment which is not adjusted either to his mental capacities or his physical tempo.

It is, of course, true that there are many mass causes of absence from work, such as fatigue, which may attack a whole plant after the plant has had an extended number of extra-hour work weeks. Certain types of reactions which express themselves in absence come from a prolonged period of work on night shifts, particularly in those men whose acquaintances, families, and neighbors work days, thus depriving them of social contact and recreation. The large employment of women may manifest itself in terms of job turnover and absence, but these conditions will vary from plant to plant, from department to department, and from individual to individual, and any attempt to deal with them as part of a whole subject covered by absenteeism can have as little effect on curing apparently unnecessary absences as capital punishment has had in curing homicide.

Much emphasis has been made upon the recent flippant answers which were found in investigations on truancy, such as "I had a date with a blond," or "It was the beginning of the hunting season." A psychological study of these answers is revealing. Sometimes a flippant answer will be given which the casual statistician will put down as the real cause of the absence whereas it represents a very distinct uncomfortable feeling on the part of the individual who is being questioned because he has no good answer even though he might have been tired out, ill, worried, or kept home by some intimate family problem. He is inclined to answer flippantly so that the antagonistic reaction of the examiner will stop the questioning. I do not believe that a flippant answer to an investigator into the causes of truancy necessarily indicates a flippant attitude toward the fact that the man was away from his bench, but often indicates a feeling of resentment at the questioning or the inability to phrase a good reason so that it will be socially acceptable, or a reaction to the whole pressure situation which the workman is now beginning to feel because of the editorials and announcements made by government officials and the general picture of the whole labor employment problem. Young, immature workers are flippant because this is a stage in the maturation process, and the age of the informants must be considered in evaluating any statistical study of absenteeism.

The Plant Physician and Truancy

IT IS a strange phenomenon that, because the term sickness is the most frequent term used in any tabulation, of course absenteeism is in major part ascribed to sickness. The plant physician is expected to keep every possible man at work, and he does this to the best of his capacity. If industry will cooperate with him, he can install such equipment in the newer plants that they will be well lighted and ventilated and the men will be prevented from inhaling noxious substances. In the older plants much of this type of supervision can be increased by the physician so that sickness acquired on the job can be kept to a minimum. It is out of the physician's province to control the vectors of contagious disease which apply to the worker outside of the plant. He rides home in a crowded streetcar where he is even more susceptible to the air-borne infections than in the plant; when he lives in crowded and poor housing conditions he is susceptible to the water and skin-borne disorders; and his ability to avoid food infections varies with the competence of the local health authorities, not the plant physician.

Indeed, in some of these aspects the physician is properly the exciting cause of the absence of the worker. He must in all conscience keep the man who has virulent respiratory infection away from the plant, particularly if he works in close contact with other men. The man who is venereally infected must be kept away from work until he is non-contagious. Even the man who is infected with a mild mental disorder which causes him to be disgruntled and discontented might well be kept away from work so that he does not adversely affect the "morale" of the workers in his department.

A vast number of absentees because of physical disorders may have to remain away from work from time to time as older men and women are employed. It must not be forgotten that men over 35 and continuing up into senescence react increasingly to the impact of degenerative diseases and, while many with diabetes or mild arteriosclerosis are able to come to work daily without being absent, these diseases and others of a similar nature affect different men differently, and all that can be hoped for with this class of patients is to keep them at work *most* of the time.

It is here, perhaps, that the proper relationship between the personnel man and the physician can find its place. If the mild arteriosclerotic is not given too difficult manual work to do, he is quite likely to work day in and day out without a cerebral thrombosis, fainting spell, or other symptoms which would keep him away from work. The mild cardiac must be handled with kid gloves, but certainly he is employable in times like these. A man's employability must be thought of in terms of what the plant has to offer him unless he is at the height of his physical strength and, if he is, the chances are that the Army and Navy can use him better than industry.

That large borderline group of physical and mental cases, those who complain of physical disorders which are psychological in origin, undoubtedly require the care of a psychiatrist and if possible the plant should not be without one. But the understanding physician may, with the collaboration of the personnel man, be able to handle even this group of problems in such a way that the neurotic whose ailment expresses itself through physical manifestations can be kept on the job either because the job is not too unpleasant, be-

cause it gives him satisfactions that he could not get in any other way, or because he feels that he is gravely needed.

The Psychological Aspects of Truancy

THE psychological factors involved in truancy are myriad. There seems to be no limit in the variations of motives, personalities, and reactions that one can find even in a single, large plant. The mildly insane man who, as a rule, is able to operate a machine and, therefore, is a productive employee may take a day off because of some fancied slight by a foreman. The perfectly normal man may take a day off because he feels that he is very tired and is really not needed. Psychological factors such as lack of motive, possible fatigue, extra-occupational influences, personal antagonisms, conflicts between the demands of the industrial task and the individual's mental makeup have been largely ignored but are obtrusive to the psychological investigation. Even in the plants in the area with which I am best acquainted, the Detroit industrial area, I know of many personnel men who do not seem to realize that each individual is different, that each has his own problems and has certain psychological traits that must be taken into consideration in order to get the best production results from each employee.

Motivation

HOWEVER, to get the most work out of any employee, he must be inspired to give his best. Management which does not recognize this need in all individuals cannot expect to get the most out of its employees. Lack of motivation is not brought to the attention of the proper authorities by union intervention because the ideas and principles involved are intangible. Adequate motivation is probably the most important factor in keeping a man at his work.

Even among my own small group of workers I have seen individual differences in motivation. The inspired man comes to work even with a fever of 104 and has to be sent home because he is physically ill. Another person is willing to give lip service and emphasize how much he wants to get ahead in the organization and will undertake extra-curricular tasks but will fail to deliver them because he feels that a "nervous breakdown" is in the offing and that, in order to keep his freshness and ability to do his ordinary jobs, he must be relieved of the overtime or excess. One sees such a phenomenon as the person who gets physically ill with a "sick headache" when the hours have been excessively lengthened even if there is adequate overtime pay, although I must note that good remuneration sometimes removes some of these symptoms.

PATRIOTISM: I cannot believe that government labor officials today realize how essentially unmotivated labor *en masse* is. It is a platitude and an evidence of superficial thinking to say that if the worker were patriotic he would not be away from his bench for even a day. Patriotism, like safe driving, is not a whole time occupation. No one can concentrate on being patriotic or he has no time for his daily tasks, but he should have a basic desire to do his best for his country. Patriotism is a general feeling which varies from individual to individual and expresses itself in many ways. It becomes more stereotyped when it is based on a standard educational pattern as in Germany, but its variety of expression, its differences in manifestation are emphasized in the United States owing to the fact that we have encouraged our people quite rightly to decide for themselves.

It was hard to get air raid wardens in some localities because our people in the midwestern communities thought that the likelihood of a bombing was remote and that there were plenty of people interested in this activity to do the job. Most men, therefore, "let George do it." Had there been any specific education by military men prior to the call for volunteers after Pearl Harbor, the number would have been increased, and had there been any such thing as a token bombing of any community, no matter how remote, so that there was a real threat to the midwest, there would have been no trouble at all in getting volunteers. Even with individual differences of patriotic motivation, I believe that all of our Detroit workers are anxious to give full service to their country provided they could be made to see that such service really does help the country and is not the useless brainchild of some "genius" or a process to exploit them. I doubt very much if the majority of the men who constitute the major proportion of absentees in our Detroit industries are any less patriotic than those who are on the job all the time. But the reason for being on the job all the time is very hard for men to see, particularly in large industries.

When a man is not given the ego-satisfaction of feeling that *his* job is a key job and that his being away will *really* make a difference, the choice between staying away when he doesn't feel any too well and going to work is a difficult one for him to make. But the same man who stayed away because he was tired or bored could very easily be aroused to pick up a pitchfork or rake handle to fight the enemy single-handed were the enemy to appear on the banks of the Detroit River. The invidious comparison has frequently been made between the soldier in the field and the worker. The soldier, quite rightly from his point of view, says, "If the worker had to face all the danger that I do and risk his life and could see what I see, he wouldn't be so indifferent about the whole war situation." The soldier has to work under high tension, and is working with a large number of other men who are beautifully disciplined and indoctrinated. With him it is not how much he is being paid for the day's work, and he naturally resents seeing people getting high wages, slacking when his life depends on what they produce. The worker, on the other hand, sees at the end of the war employment, no pensions (as for the soldier), no heroic recognition during the war except as part of a mass, the very great potentiality of inflation, and an inability to feed his family which, parenthetically, is not an incentive to work harder to save more money but rather causes the worker to develop a feeling of indifference and to drift along with the stream hoping that everything will be for the best.

It is very true that it is unpatriotic for the worker to stay away if he is making a part on which the soldier depends, but I am sure that in the Detroit area a very large proportion of the workers do not know where the part goes that they are making. Most of the workers do not know what part they play in actually supplying the armed forces, for workers have told me that for all they know their machine may be an unnecessary one just building up bushel baskets full of screws or small parts which might never be absorbed into airplanes, tanks, or other pieces of armament for which the stockholders charge the government. The close dovetailing of each part with the actual assembly which modern industrial plants demand is never made clear to the individual worker and cannot be made clear unless the worker has a chance to see just where his own part enters into making the tools of war. The frequent shutdowns for retooling and changes in production which keep the men partly employed add to the feeling of unimportance that workers often develop, although Court[2] points out that there was more ab-

senteeism in the plants where he made his studies at times when production was high than when the work was slack. The obvious interpretation of this is that there are a large number of men who didn't dare be away when production was slack for fear they would lose their jobs.

THREAT OF DISCHARGE: The incentive arising from the worker's fear of losing his job has practically disappeared at the present time, as well as many of the ordinary incentives to do effective work not only in industry but also in allied clerical fields. The labor pool is now so shallow that no worker, even of relatively small competence, has to worry about getting a good job. I have seen cases in the Clinic who are feebleminded, have bad dispositions, who prior to 1943 had been chronically out of work because they couldn't adjust in any factory, who not only got jobs immediately upon leaving jail where they had been sent because they were chronic delinquents, but also have been able to hold those jobs. This was not due to any improvement in their own make-up, but was due to the fact that employers were willing to take anybody who could do something to contribute to the war effort. It was amazing to me, for example, to see a boy who was practically an imbecile in intelligence, who had never worked before, who couldn't complete the third grade in school, employed by one of our large Detroit war plants as a draftsman at a greater salary than the City of Detroit was paying the psychologist who examined him. Naturally, he was so low intellectually that it was not long before he was discharged.

The fear of discharge, which in times of superfatted labor market keeps the workers' noses to the grindstone more than any other incentive, is not now present so that if the employee is to be kept at a particular job it must be one that either gives him satisfaction of earning money by which he can buy something, to be able to take pride in what he is doing, or it must be one in which he is particularly skilled to gain satisfaction from a job well done. Even if he is relatively unskilled but, particularly, if he knows one of the crafts or trades which are in great demand, he knows that if he is discharged from one plant he can get work in another in times of a short labor supply.

ECONOMIC INCENTIVES: Economic incentives are relatively absent at the present time because of the freezing of wages and the shortage of things to spend increased wages on. It is obvious that it is important to freeze wages to prevent inflation which would cause an all-out mental depression among laborers when they found that even their rapidly increasing wages would not be adequate to keep them in home and nourishment, but the absence of this incentive is important in the creation of absenteeism. If men who do more work, who are on the job consistently, could be recognized and promoted, this incentive would be of more importance than it is now, but there is little promotion in mass industry except when holes are left by the draft. Another factor which is important and which exists constantly is the lack of places to which to promote the efficient and consistent worker, for most work is done by those at the bottom. A worker who stays on the job consistently but is not particularly efficient seldom gets a promotion. For that reason his job becomes one of routine, for he knows that his being absent under ordinary conditions occasionally will not be enough of a black mark against him to warrant his discharge and, no matter how consistent he is in his attendance, he is unlikely to be promoted.

"WAR WORKERS": There is no doubt that the workman knows that his services are needed today. He is told by government spokesmen, labor leaders and plant officials how important he is and it is emphasized that he is "firing on a second front" which, in some advertisements and speeches, is emphasized as being even more important than the first. While an employee may be uplifted and inspired at the time that he reads such articles or hears such speeches, the ideas absorbed into his subconscious, in many instances in a bizarre form, have formed a sort of background for all his thinking, and he concludes that if he is so important he should be given as many concessions as possible; and he points to the concessions given to the soldier in the way of guarantees, pensions, etc., admitting that since he does not take his life into his hands the concessions of the government need not be so great, but nevertheless he believes that he deserves special consideration as a "war worker."

He fails to realize that the doctor who is taking care of his family, the grocer who sees that he is supplied with necessary food to keep him working, is just as important on the "second front" as he is. It has been my experience in examining certain war production workers that they often feel themselves a group apart and that ordinary standards of living should not apply to them; that they are entitled to special considerations because they are war workers, especially if they are working long hours, working in especially well advertised plants or have been indoctrinated through some particularly sweet complimentary passage by some official who has visited their organization. When they find that they are treated just as other people are I have noted that this is another factor which reduces the incentive to work hard. The workers have been led to believe that they are exceedingly important and, because of the swollen belief in their importance, they react negatively when their true status—that they are merely part of the whole war effort—is revealed to them as it must inevitably be.

Lack of Security

ANOTHER psychological factor which operates in causing truancy is the lack of security in current war work. It must not be forgotten that many of our workers have just passed through rather terrifying times during the depression, and that, while there is a boom on now, there is no security within the boom, that wages are locked, the men are fixed in their jobs by the current War Manpower edict, the workers' taxes are constantly increasing, many of them may be taken into the military forces, and, at the time of writing, their dependents are not likely to be any too adequately taken care of by pension or other means, so that I have noted that there is a great feeling of apprehension, instability, and insecurity among them.

In England, and in the continental countries, this lack of security has been negatived to some extent by the immediate need of extreme effort in direct self protection. The worker must work as a fire warden or air raid warden as well as factory worker. He sees war first hand, but in our country the worker has time to be preoccupied with the future. Under conditions of insecurity mental weakness manifests itself as a physical symptom. The man who is worried becomes aware that he feels tired or worn out. He does not have the ambition to come to work. He represents the type of case which, in the early days of psychiatry, used to be called "neurasthenic." This was the man who was "just too weak to work," who was annoyed by every noise and easily thrown off his balance. Such a man feels that he has a legitimate cause to stay out of work in his ailment.

INSTABILITY PLUS INSECURITY: Probably the greatest need that any worker has in his occupation is security, yet security without incentive does not produce maximum production. It produces absenteeism

from mild mental disorders or from worry which expresses itself in stomach trouble, muscular weakness, palpitation of the heart, lack of sleep, and other rather elementary symptoms of that sort. Every part of our current war picture may act as a factor which will throw the unstable into an apparent physical ailment, and it must not be forgotten that we are employing more unstable individuals than even before.[15] The fact that a worker is not sure that he can get butter, that his meat or canned goods are rationed, that he sees fresh vegetable prices rising so that he doubts whether next month he will be able to afford adequate food for himself or for his family because of fixed wages preoccupy him and, instead of causing him to work more regularly in order to build up a reserve, he feels that his reserve may be thrown to the winds by rising prices and he might as well enjoy what he has today.

FINANCIAL VALUES: In Britain the incentive of increased wages or overtime wages was lost when the false idea got around that extra work merely meant increased taxes so that the extra hours were being put in for the government without any resultant reward for the individual. If that could happen in Britain when the threat of actual invasion was present, how much easier it would be to take effect in the United States. Ordinary incentives have little value in an insecure world. First of all, with the diminishing supply of goods which can be bought, wage incentives are worthless and bonds which should be bought today are of little psychological value to the ordinary worker. It is true that the man who has in the past had an income from stocks and bonds has learned the value of investing for the future. Workers who are accustomed to living from hand to mouth seem to be particularly susceptible to such suggestions as have been reported in Canada that "the government does not mean to pay back the enforced savings," even though the Canadian government has never defaulted on its obligations.

Poor Work Habits

ANOTHER important psychological factor which contributes to the problem of absenteeism is the fact that many of the employees who are being put to work today have had little education in the need for being regular in their work and not only do they not, as I have indicated above, know the value of the particular operation in which they are engaged, but they have not worked in a factory under pressure conditions such as those previous to 1942, where regular work meant regular employment. In every factory there will be a few absentees, many of them legitimately so, particularly where there are a large number of older workers. In tight times these old workers are disinclined to let their feelings of discomfort or ailments or illness run away with them, but, as times get better and they have money for physical care and can afford to take time off to recuperate, they are inclined to respond to their depleted physical energy. Their example works badly on the new employee who has not been educated in factory conduct in any course which he has taken in welding or machine operation. He has learned to go through the mechanical procedures required on his job, but he has not learned good factory habits outside of good habits connected with the care of the machines or instruments that are being used. Little active indoctrination is employed, and yet it is quite possible in these courses where potential war workers, particularly women, are being trained, for such education to be given. The lack of such habits has resulted in some bizarre cases. I know of young boys who, faced with almost immediate draft, work for a few months, perhaps get married, and want to take a few days off each month because they don't need as much money as they are earning. When they are accused of being unpatriotic they point out that soon they will be in the Army and will be a "damn sight more patriotic than you are," and are, therefore, entitled to a little time with their wives before they are sent to lose their lives.

In the case of women, in most occupations where women have been employed allowances have been made for menstruation and the fatigue that comes from the lack of experience in active and mechanical physical work. Such allowances are not yet made in many factories. School teachers in Detroit schools have been allowed as many as 12 days a year to take care of menstrual discomfort or fatigue, and these women, when transferred into a factory situation where personnel men often have very little knowledge of women to begin with, tend to take these days off whether they are provided in the industrial plan or not. If they have been housewives they have worked at their own pace, and when they were tired they usually had been able to arrange for some time to rest. Young girls, although I must admit that these constitute the smallest group of absentees as a rule, are not used to any kind of hard, consistent work of long hours, and there is a tendency for them to taper off when they lose interest.

Among the young men it has been noticed that large earnings are important factors in truancy. Since these men are not accustomed to working consistently for long hours and since, in many instances, their jobs are only temporary ones pending the draft, they never do become habituated to the pace and routine of the plant, and stay away from work for fairly trivial reasons. Not only that, but when they get their large pay envelopes, more than most of them have ever had—in some instances more than they can actually spend—and since they usually have no family obligations, they are inclined to spend this money in mild antisocial behavior, carousing at night and drinking. As a result of this they are often too tired or too physically ill of alcoholism to come to work.

It is too bad that these young men got into high paying factory work too easily within a few weeks when they jumped economically from the protected home situation where they were given a small allowance to care for current expenses into a situation where spendthrift conduct was the only outlet that they had for their excessive income. It was a new experience for them to be earning so much money and, with the dare-deviltry of youth and lack of balance, they plunged into it with unfortunate results from the standpoint of their work and conduct habits. We can expect that this particular problem will disappear as more of these young men are drawn into the service, and it is fortunate that they are going into the service where the pay will be small, where they will be disciplined and face military training and experience hardships, and where most will see the need for husbanding their small resources.

Again, in the case of women, I have noted that they do not realize what factory life is like and it comes as a shock to them. Not only is there a lack of indoctrination before they go on the job, but unfortunately the pressure of work in wartime activities overshadows the glamourization which frequently leads women into the plants. Women in war work are highly essential to replace drafted men and represent a new aspect of sexual rivalry and, therefore, are highly glamourized. A number of young women, with reminscences of the glamourous publicity, have entered plants little realizing the drabness, the dreariness, the monotony, and the hard work involved. Many of them, motivated by the highest patriotic motivating ideals, stick to their lasts

and continue to work hard. Many in a given factory have splendid work records, but others in the same plant, finding the work tiresome, think nothing of taking off a day from work to take care of some matter that demands their attention at home, a tea or some other less essential activity, because, first, they feel that they are inept at the job, and, second, they are emotionally let down by the disappointment when they find that the glamour that enticed them was not there.

There is a third group to be considered in looking at the poor work habits which account for some truancy, and that is the group of inadequates, such as old people who cannot stand the gaff, and the defective personality types who are neither motivated by patriotism nor able to stand up to grueling factory conditions. Some of these individuals find themselves in persistent conflict with the authorities because they are abnormal types, and foremen and superintendents cannot understand them. Others find themselves in conflicting interpersonal relationships which are emotionally depressing and result in feelings of dejection and heighten their feelings of inadequacy.

Because of war conditions, a number of men have been called back to work in plants and other activities who were de-industrialized for a number of years during the depression. Some of them lost their skills. We can thank the Works Projects Administration for the fact that the skills of some of them were saved. Many of them forgot how to keep their jobs continuously, even though no particular skill was needed. Some Works Projects Administration projects did not require a high degree of skill. The hours were easy and, while careful absence records were kept, it was impossible to penalize the men for absences, particularly if they were absences due to mental illness, discouragement, or a physical ailment based on mental conflict, when the workman's family would starve if he were penalized. So the habits of constant work based on the pride of their jobs which many of these men had developed by the beginning of the depression were lost by the time they were taken back to work for the war effort. In addition, there are a number of older men who for many years have been retired, have been on pensions or on relief, who are now being taken back into the factories. These men are too old to acquire some of the habits demanded by modern industry. Many of them worked at handwork when they were first industrialized. They may have been quite competent in those days but cannot acquire the habits demanded today.

ATTITUDE AND WORK HABITS: One final aspect of the influence of poor work habits on this matter of truancy in industry must be considered. Work habits, not those which are involved in the actual manipulation of machines or those of men who are prompt and reliable, but those which are involved in getting along with other men and habits of self-sacrifice have, in many instances, not been cultivated. I do not believe that American industry is unique in this, and I question very much whether the workers in any of the Axis countries in any particular industry or in Britain or in Canada have an over-all feeling of fellowship. Certainly a number of traditions grow up in industry. A number of interpersonal relationships grow up which are modified, first of all, by the mass habits of employees in general and, second, by the attitudes which grow up in the particular plant. These attitudes, existing over long periods of time, become habits in the sons that they guide, the daily activities of the men in any plant. The very thorough and revealing work of Roethlisberger[11] and his associates has revealed so much about interpersonal relationships in plants, the relationships of foremen to men and the traditions of workers, that it seems amazing to see the great extent to which they have been ignored in developing industry during the current war effort. A pertinent finding of these investigators is the attitude of workers toward production, and I found the same thing in their attitude toward absenting themselves from work. Roethlisberger found that many workers will not work to their maximum capacity so that the other workers will not think that they will spoil the job. These men get discouraged and absent themselves because they are not working to capacity. I found that frequently Works Projects Administration workers slowed down for fear that there wouldn't be another project upon which they could be placed.

Other workers worked harder than their actual capacity and rhythm because they were afraid of being considered shirkers, so they stayed away from work because they were tired out.

Squealing is frowned upon, so that the workers who see something go wrong in the plant will not report it, leaving the whole matter of supervision to the foremen and those outside of the workers' own social groups.

These attitudes show up in absenteeism in another way: several dominant personalities in a department, particularly self-centered persons who have little interest in the war effort because of excessive self-interest, decide that it is time that they should take a day's rest, and the weaker personalities in that department will follow them. It is a habit of industrialized employees that one should not run against the pattern and, as a result of this phenomenon, whole departments will close, or at least a sufficiently large number of workmen will absent themselves at a particular time so that the department constitutes a bottle neck. Court's[2] studies on absenteeism show this to have happened in 1941 and 1942 when the deer and pheasant hunting seasons opened in Michigan. I might add a word—these social habits in themselves are not bad. Group loyalty properly used in industry, as Roethlisberger has pointed out, can be a very valuable tool in personnel work, but it is one which, to my knowledge, is not being used by any personnel department in the Detroit industrial area.

The work habits of good and bad peacetime industry are merely being translated into the war work, a situation which is unfortunate because skilled personnel men could have demanded personnel changes and worked with the men themselves to build up an *esprit de corps* surprisingly early in these many newly-built plants. They could have developed loyalty toward the production goals of the plant rather than toward a superficial social group, toward management, or toward any other old-fashioned industrial group, and this could have prevented very much of the current problem of truancy. The probable reasons for not introducing personnel work as modern as the new machine are lack of well-trained plant psychologists and the fact that employers have not yet been shown what modern industrial psychology or psychiatary can do.

Personality Problems

THERE is a lack of space here to cover completely the matter of personality problems arising in plant personnel. In every plant there are all sorts of personality types. Personalities will come in conflict with each other in industry as well as in social life or in politics. Groups having conflicting social interests will continue to come in contact with one another whether there be a war on or not. Such conflicts, well handled by the personnel or medical departments, very fortunately need not impair the war effort to too great an extent.

THE INADEQUATE PERSONALITY: In industry today the inadequate personalities seem to create most of the

problems of truancy. These are the workers who cannot stand even the routine of work, and who fall down under pressure; and they are the workers who find themselves unable to come to work when the family has sickness or financial difficulties, and who react particularly badly when there is a period, such as there is in wartime, of insecurity.

THE EGOCENTRIC PERSONALITY: Another group which has struck me markedly as a problem labor group is that one comprised of egocentrics. Quite frankly, I do not consider these people patriotic. I think that any patriotism they exhibit is shown only through lip service and fear of what might happen to them if they were overtly disloyal. In this country of free speech and free press, it is easy to find egocentrics who sympathize with the Axis nations but who, because they commit no overt crime, cannot be arrested. They do not sabotage, they do not commit espionage, they are merely Axis sympathizers in that they are "agin" everything that interferes with their ease and pleasure. They urge contempt for our allies. They are unsympathetic toward minority groups. Fortunately these abnormal individuals are in a very small minority, but when one is found he sticks out like a sore thumb and often not only is a rumor-monger but is also a frank agitator who can disturb a whole department or a whole plant. Egocentrism is contagious, particularly if nothing can be done about it. With a shallow labor pool and fewer skilled workers available, the skilled worker can be very egocentric and very much of a personality problem in industry while still keeping his job, for he is not in danger of discharge and certainly there cannot be blacklisting.

I have seen a few cases where labor unions have asked me to look into the problems of a worker with regard to whether the employer had discharged such a man righteously. I said in two instances that, from my experience, it would have been better for a mildly insane man to be placed on a job in a factory than one of these egocentrics. They are almost uncontrollable socially, although they may do fine work. It is most difficult to remove them from their jobs because there is nothing in the union's contract with the management in most instances which would make their discharge appear to be anything more than an act of malice on the part of the management. Very fortunately, even though these matters are not covered by contract, I have been able to get both the union and management to see the light after a psychiatric examination of such a case discloses the egocentricity and reveals the malice and viciousness that such men exhibit. Even while this paper is being written an examination is being carried on, by one of my workers in the next room, of a man who deliberately violated the speed laws. He missed a day's work because he was brought into court and now, as I am writing, he is threatening to change jobs because, if he is to lose his preferred gasoline ration and driver's license, as regulations demand and as an example to others, he will leave his job because, "I don't need the money and they need me more than I need them."

These egocentrics take an antagonistic attitude toward law and order. They are not corrected by being jailed. They need a thoroughgoing mental disassembly and reassembly, but can be corrected by individual therapy by a psychiatrist or a psychiatric-thinking plant physician. If these men take it into their heads to be absentees, they will stay away from work regardless of any war effort, regardless of the fact that this truancy might cost the life of a soldier in the field, just as they will commit a traffic violation because they want to drive fast, want to carouse and disturb the peace, or, in other ways, break the law. Even though there is a minority of them, these men are sufficiently dramatic so that the weaklings will follow them. Upon seeing them absent themselves, others will follow them. I have no figures to show the large number of industrial truants I have seen who have been egocentrics of this sort as well as traffic violators, but I do believe that, if they do not constitute the largest part of absence-prone individuals, they do constitute at least the nucleus around which the absence-prone individuals gather.

ABNORMAL ATTITUDES IN NORMAL WORKERS: There are individuals who have abnormal attitudes toward industry. They comprise large groups but they must be considered normal psychiatrically except when they transgress. When they become abnormal absentees or traffic violators then their unfavorable attitudes become detectable. Many a man who under ordinary conditions would be given a clean bill of health by a psychiatrist becomes aggressive when he gets behind the wheel of a car, or exhibits some other abnormal trait which reacts to the detriment of society.[16] Such men in industry may be good to their wives at home, they may be wonderful partners when they are playing golf or bridge, they may show a high degree of social adaptability under such situations, but given a period of emotional pressure, perhaps when a great increase in production is demanded or because there is some management-labor conflict in the plant, these men develop a very bad attitude.

Sometimes some person, such as a foreman or superintendent, will aggravate an apparently normal man so that he shows abnormal aggressiveness and resentment and as a result of the development of this attitude becomes a chronic absentee. Here again Roethlisberger,[11] in his studies at the Western Electric Hawthorne Plant, clarified many of these features, and they should be taken into detailed consideration in any psychological evaluation of industrial truancy.

Psychophysiological Problems

PSYCHOLOGICAL AND PHYSICAL FATIGUE: Britain's experience with the continuing falling off of production in spite of all sorts of rather dramatic and drastic moves along the lines of legislation is highly suggestive of the place that fatigue and monotony occupy in the problem of truancy. Workers will report themselves sick or will say merely that they "couldn't" come to work, so that one thinks that they were acting on a whim, while, as a matter of fact, they have passed their physiological or psychological capacity to work. No one can take issue with the 84-hour week which was invoked in so many of our Detroit factories immediately after Pearl Harbor. Tools had to be produced even to the point of diminishing returns so far as the physiology of the worker was concerned, but the diminishing returns became accentuated as workers had to go 20, 30, and even more than 40 weeks without a holiday. Provision was never made for a relaxation after the first group of tool machines were turned out, even though other industries might have been sufficiently tooled to go to work; and the pattern exhibited by workers in some of our Detroit plants duplicates some of the exhaustion experience in England in the first World War shown by H. M. Vernon and J. R. Rees[10, 17] in their studies of the effect of hours of work on industrial efficiency. These and other similar studies have been recently carefully reviewed by Kossoris.[7]

Not only did long hours of work produce less hour-man output, but production continually slumped. When the hours were shortened, a proportionate increase in production did not show up for a considerable period of time. Absenteeism, allegedly due to ill health but

probably due to physiological and psychological fatigue, accompanied the loss of production because some of the decrement was due to the absence of key workers or a large number of workers.

The human organism is not made to work excessive hours and requires a certain amount of time to recuperate which is not spent in sleep. There have been many studies made showing the favorable effect of play and recreation upon work output, and the absence of time to do these things has been a problem among Detroit workers in 1942. As work output falls so does regularity at work. The same loss of incentive to make the man work hard is present to make him stay away from work. It must not be forgotten that noble ideals, loyalty to one's country and other non-concrete but powerful urges disappear in the fatigued and ill man. He becomes self-centered. If he is a soldier he may be easily rattled by a well placed attack by the enemy. If he is a worker, a slight suggestion may keep him away from his bench.

MONOTONY: Some of the duller individuals are able to make adjustments to monotony, like the man who was asked what his job was on the production line and answered that he didn't know, he was thinking about something else all the time, or, the feeble-minded girl who, when asked why she did not lose fingers in the punch press like her predecessors had, said "they were always thinking about their work but I don't think." Most of our workmen are not like this. We must remember that among our workmen there is an average amount of intelligence. Some of the workmen are even very bright, and there is an insufficient number of rather dull ones who can take routine work in their stride. The easiest way for the bright man who is not particularly ill, who does not want to change jobs in order to get variety (because, perhaps, he does not know that he needs it), to get the change that he subconsciously craves is for him to absent himself from work. Very often such a man is torn between his desire to do the patriotic thing and his feeling that he needs to get away from the machine for a day or two. Such men as these who are conscientious but exhausted psychologically—and there are more than most plant doctors know—are whipped to a degree of listlessness or negativism by newspaper announcements that such absentees are traitors. They are truants, but they are satisfying a psychological urge in the same way that vitamin-starved children have orgies of orange juice. Some Detroit psychiatrists have recently noted hysterical and neurotic attacks among bored and overworked men who are bludgeoned by articles and editorials on absenteeism.[6]

NUTRITION: Another psychophysiological factor is that of nutrition. Government departments in Ottawa, Canada, early this year after long hours were adopted, noted an epidemic of fainting spells of women employees late in the morning and early in the afternoon, and it was found that, because of the long hours, girls had to use their lunch periods to go shopping. They were not absent from work, but they might well have been more fair to their employers had they absented themselves than to go without their lunch and stay on the job only to faint; this takes the time and effort of several others to revive them and to take them home.

Women particularly have bad habits from the standpoint of industry. They are often accustomed to light breakfasts, particularly if they do light work in the morning and particularly if they have to prepare their own breakfasts. Being unacquainted with the demands of industrial work upon their physiques, many women have had great difficulty in learning what to put into a lunch-box. Strange customs have grown up in some Detroit plants, and it is considered a social error for a woman to carry a lunch-box with adequate food, a warm drink, and an occasional salad cup for an assumably balanced diet. Instead she will bring a paper bag, which probably excludes the warm drink and the fruit she needs to give her the necessary vitamin C. Such abnormalities in the feeding practices of women do not seem to be individual peculiarities. Instead they come, I believe, from the transition from doing housework or leisurely office work to working in factories. The demands of the jobs are different, and the hidden nutrient supply is almost automatically better at home, where there are at least a few fruits and vegetables at hand all the time and the woman who eats a light meal and tastes a little bit between meals can get a certain amount even if she doesn't eat them at mealtime. This light eating, as well as not preparing a definite meal for herself, causes her to become habituated to her food habits. The neglect of the fundamentals of diet is probably noticeable in all workers, but the writer has urged, in a previous paper in this journal,[14] that somebody in the plant, the physician if possible, interest himself in, first of all, the nutritional education of his workers and, second, and even better, the furnishing of a properly balanced diet with proper incentives for the worker to eat it. All the frequency of absence from work due to illness attributable, at least in part, to weakness of the nutritional picture may be considered medical, but the basic factors behind such absences are psychological. The worker doesn't know what to eat; he cannot be induced to eat the things that are right for him either because education or incentives are absent. Worst of all, this may be due to government regulations which make it impossible for him to get what he needs—as in European countries particularly, where there is a restriction of certain important articles of diet such as meat or, as we have found, during the holiday season in Detroit government regulations restricted the wholesale supply of meat and butter so that retailers were unable to give workers what they needed. This is particularly true of families where both husband and wife are working or where the wife was the worker and could not get to the stores before stocks of meat and butter were exhausted.

FEMININE PROBLEMS: One other psychophysiological problem must be dealt with here, and that is the problem of women in industry. Regardless of the fact that in many European countries women stand side by side with men in their physical work, thus indicating that women can undertake equal physical tasks with men, the period between 1930 and 1940 when there was a dearth of jobs left women taking care of households or even doing no work at all, which softened some muscle groups and organs needed in factory work. While it is true that doing housework, particularly for a large family, is fully as exacting and demanding of as many foot-pounds of energy as working at many machines, the general run of housewives, with their labor saving equipment, small families, and the type of work they do in housework did not harden the same number of muscles or the same groups of muscles that hard work in industry demands. Hence, I have noted that women usually have to be started in their physical work gradually or they become discouraged because of muscle aches and pains. No attempt, so far as I know, is being made to do this *en masse*, although a few separate factories in the Detroit area which employ women do make such concessions.

There is another adjustment problem in employing women which is not recognized by employers who are accustomed to men workers. Men who have spent years in industry will move from job to job and occupation to occupation until they find one that suits their interests and needs. In wartime women are being pro-

cessed into plants extremely rapidly, and machines and women are mated immediately without much consideration of conflicts that might be caused by a woman's background; for instance, whether the machine is a filthy, dirty piece of equipment and the woman is a fastidious person who might be revolted by it. Don Wright, of the N. A. Woodworth Company,[19] has pointed out that a great deal of his success in keeping the plant's women at work has come from expertly sizing up the personality of the woman and giving her a compatible job to do in the plant. The dull, stolid girl makes a good machine operator, while the high-strung, alert girl may be a very much better inspector and, if put to work at a machine, will begin to absent herself inexcusably in a short time because she cannot tolerate the boredom of her work.

Menstruation is another problem that has to be dealt with. As I pointed out above under "Poor Work Habits" the tradition has grown up that women should have time off for menstruation. Women have developed a tradition about menstruation. Many of them actually, of course, have dysmenorrhea, but most of these cases can be treated properly by endocrine therapy, and I am sure that it will well repay a plant to have an endocriniologist go over the girls who complain of dysmenorrhea and provide therapy at the plant's expense.

Sometimes others whose menstrual period is not particularly difficult acquire the idea that they should stay home either because of tradition or because of suggestion. Even a girl with slight dysmenorrhea may be very much healthier working at the plant and being distracted than staying at home, moping over her aches and pains, which assume a disproportionate value in her unoccupied mind.

On the other hand, it must not be forgotten that during the menstrual period women do tire more easily and monotonous work causes them to become more irritable, so that reasonably pleasant surroundings must be available in the wash and powder rooms for their comfort. Menstruating women may become definitely irritable and an administrative problem, and so I believe that, if it is at all possible, specially trained women foremen should be used instead of men. But the women foremen must be picked with great care, as often women when supervising others cause interpersonal relationships which do not occur with the traditional masculine supervision. A word may be added here of women's psychological problems of a non-physiological nature. Even where most careful personnel work is done in selecting women employees there may be truants because of factors operating in their cases which do not occur in men employees' cases. Many married women have children to care for and have to prepare the meals for their families, and the additional care of a child as well as housework is more than the average woman who has put in a day's factory work can stand. She becomes tired, discouraged, and absents herself more and more until she quits. She will force herself to work and her production will go down so that she will become embarrassed and thus become an occasional absentee. She will get tired from the fact that she has to do housework when she gets home, whereas her husband, who has been working in factories for years and is habituated to it, still uses his leisure hours for rest and relaxation. She will have to stay home if her husband or children are sick unless she has someone else at home to care for her family. Last but not least, economic problems will affect her more seriously than they will men, as she must do extra shopping during food shortages, she must learn new rationing rules, and very often the health and contentment of the family rest on her shoulders. It has not been a strange phenomenon for a whole department of women in a Detroit area to stay away from work for a day when the rumor got around that long-wished-for steaks could be purchased at a store far from the plant, or that there was a shortage of canned milk and "you'd better get yours today if you can."

The Treatment of Truancy

SINCE absenteeism is important, particularly in the mass production industries where substitutes cannot be easily obtained, a knowledge of the causes should aid one in prescribing treatment. I do not believe that treatment can be a wholesale affair to apply to all plants in all parts of the country, even if government policy is a partial cause. Unfortunately up to now loss of production and absenteeism have been thought of in terms of great movements. This is a result of showing how serious the problem is by means of statistics. The worker as a person, and the individual foreman, supervisor, manager, and labor leader have been left out of the picture.

It would seem that the cure for inadequate production, as well as industrial truancy, lies in, first, a highly individualized approach and, second, the use of only such mass approaches as have proved their psychological values in other human activities. The writer could no more approve of the mass condemnation of industry by a spokesman for the War Production Board than he could approve of a pep talk given by a coach to a hopelessly beaten team. An open letter to large numbers of laborers telling them that they are traitors or in other ways that they are not cooperating in the war effort—as one advertiser did—will cause the loyal worker and regular workers and non-absentees who really comprise about 80% of our workers and more to have guilty feelings.

It was my experience to talk to a man who worked seven days a week, 10 hours a day for the last 40 weeks and finally, when the furor which occurred in February about absenteeism reached a peak, came to me for advice. During the interview he broke down and began to cry. He had reached the breaking point, and felt just as guilty about taking a day off for medical treatment as he would have had he committed a crime. Many other workers were similarly affected. During early March, 1943, I noted an hysterical wave in some factories where there had been a minimum of absenteeism but where the workers began to feel that they were not living up to the war effort. Some of these people badly needed a vacation but would not take one. The competent coach does not harangue an obviously broken-spirited, fatigued, and loyal team which has been "playing its heart out," but he tries to provide substitutes, frequent rests, and ingenuity to make his team win if it is at all possible. On the other hand, where a lagging team has been doing extremely well and just needs a little bit more punch, a good talking to by an expert is worthwhile, so we cannot entirely discount the value of "pep talks." Personnel experts have told me that a word or two spoken by the President of the United States in one of his fireside chats can change the whole outlook in a plant. In the same way a soldier returning from the front and thanking the workers in a particular plant for delivering the goods has given at least a temporary lift to production and cut down truancy. My suggestions for treatment of the problem of truancy are as follows:

1. Extra-medical Treatment

HERE the various social problems involved in the worker's ability to live and to be transported under physically and mentally healthy conditions to and from work must be evaluated. Women cannot be expected

to come to work regularly if they have to take care of their children and their homes besides doing an eight to 10 hour stretch in a factory. Far better to provide the soldier's wife with a substantial pension so that she does not have to work until there is an imperative need for it. If poverty or the fact that women with families possess particular skills make it necessary that they be employed, there is a distinct responsibility to both government and the industry involved to see that the children are properly cared for and that the mother is relieved of housekeeping and child care so far as possible. It should be possible, first of all, for her to come directly to the plant with her children and to leave them there as long as she is at work. I even believe that it would be worthwhile feeding them all three meals and allowing her to eat with them for at least one rather than have her go home and cook a meal for them.

Another possibility, of course, is the use of split shifts. If the demand for women workers becomes great enough so that the married women with children will only have to leave the children in nursery school for one or two meals and part of a day, they will not then be so tired that they will have to absent themselves unnecessarily to regain strength. The idea has not yet been mentioned, but the plant physician should consider the possibility of having a small hospital in connection with the nursery school so that if the children are found to be sick they need not be sent home and the mother taken away from work, but instead they can be hospitalized and given far better care and supervision under trained personnel than under the mother's care. I am aware of the shortage in personnel, but it should not be more difficult to train nursery aids and nurses' aids for plant service than for nursery schools and hospitals under other auspices, and the fact that they could be paid would encourage the enlistment of a high-class group. If the mother knows that there are these services available she will be willing to come to work, whereas if she leaves her home and children to the care of an unskilled or not too trustworthy neighbor or relative, the balance is tipped in favor of her staying home. I have personally known of women who had to take an extra half hour both going to and from work to leave a child at a nursery school, using time which would be valuable for relaxation ideally in the company of her youngster.

The pooling of youngsters of school age in certain homes or in school after school hours is a necessary consideration for the care of school-age children of women workers. The availability of easily accessible government restaurants in Great Britain has relieved many women of cooking, provides a balanced diet, and also utilizes to the utmost of their nutritive value the foods which are short. It would seem that there should be a possibility of providing pre-cooked meals for the woman worker. I would not be surprised to find that worker husbands would find the food more palatable.

A second group of extra-medical conditions are involved in proper housing and transportation; and until these are properly cared for, men will have to absent themselves even though they are not sick to get time to solve the problems arising from the breaking down of their cars or the conflicts in families when too many are living in a small space. In addition, problems of purchase of food, shopping, and securing adequate fuel so that the worker does not have to stand in line at ration boards need to be solved. A number of plant ration boards, stores, and restaurants would help if we could overcome the tradition of having stores or boards distributed on a neighborhood basis.

The next group of problems to be faced of a psychological nature but not medical are those which arise from insecurity. The government must make certain definite and adequate postwar plans so that the worker will not be living in apprehension from day to day. He must be convinced of the security of the money he puts into bonds or compulsory savings, he must be assured of a future job if he is conscientious and works to the utmost even if his actual skill is not too good. Conscientiousness probably should be the key to and guarantee of consistent employment and, of course, the factors that go into conscientiousness must be carefully considered with the help of a trained industrial psychologist in setting up any government proposition or any management-union relationship dealing with security.

There are production factors to consider, but the physician can remain relatively aloof from these. Suffice it to say that men get discouraged when there are constant layoffs for lack of material or changes in model, and perhaps the most pernicious of these factors is labor hoarding, holding men on jobs when they are not working to capacity so the plant will find them available when occasion arises in the future. Inefficient plant operation is also discouraging, for men feel that they are not really needed except that more men are used in an efficient plant—and the men really show good critical sense here.

It does not help either for the men to see thousands of cases of finished products waiting to be carted away for months at a time. A tremendous finished inventory has piled up in some Detroit plants and the workers there cannot see urgency in their work any longer.

2. Medical Problems

THE industrial physician needs carefully to study the individual so far as he has time. He should provide himself with assistants in the social field who could take histories as well as interview patients, even if he has to provide for their training by giving them leaves of absence to work in hospital social service departments.[13] In battling the problem of the absent worker, he should take into consideration working hours, the type of labor that the man is engaged in doing, and his earlier consistency on the job. Many men need specially careful handling to keep them at work, but when they get such help they become good producers. The physician may have to work closely hand-in-hand with the personnel department. For special treatment of the borderline worker who is still productive but yet is a little bit maladjusted and expresses his difficulty in absence, he may even have to provide mental hygiene counseling and have *skilled* social workers or nurses on the staff who can deal with the community problems that this employee might have. Such a policy has worked well with the personnel and medical departments of one company—which has a very low absentee record—where there are social workers to go into the homes of the workers to try to prevent problems which cause absence.[19]

In addition to the problem of actual illness and pseudo-illness on a psychological or fatigue basis, the physician should keep one eye on the feeding problems in his plant. Haggard and Greenberg[5] have shown the value of between-meal feeding, and other studies have indicated the value of rest periods[18] in the cutting down of fatigue, and these consequently would cut down truancy. Every plant physician should be engaged in supervising the work of his dietician in educating the plant workers and seeing that proper food is provided for their lunches and that they are educated to eat right.[14] If he hasn't a dietician he had best get one or train a member of his staff in nutritional science.

The problem of menstruation is one which should

not be disregarded. As I suggested in the discussion of women's problems, *supra*, I think it would be worthwhile for plants employing a large number of women to treat cases of dysmenorrhea at the plant's expense. Certainly women should be encouraged to work during those periods, but an effort should be made to give them opportunities to lie down or, if necessary, have substitutes take over their work. It is much better to have them report to work and try to keep on the job until they prove not to be able to keep up production than to have them stay home at these times when complete absence is unnecessary, to think themselves into chronic menstrual invalidism. It will require a good deal of good sense and medical knowledge to handle this situation tactfully and not simply with harshness. In fact, a sex-education program may be useful.

3. The Plant Physician and Production Elements

THE physician should have a close tie-up with the foremen in the plant. If he does nothing else in this contact but give information in literature and conference, he can make inroads into the problem of absenteeism, including truancy. The foremen or supervisors should be taught to look for fatigue, malnutrition, worry, and to have some idea of "spotting" the early appearance of physical ailments before the sufferer becomes a problem. Early treatment may mean absence for one day, while neglect may mean a long siege of absence due to illness, worry, or, in the case of mild mental cases, truancy. This will require considerable mental hygiene education on the part of the plant physician, with some help from the personnel department. It may mean an increasingly careful selection of foremen, not only for their skills on the job but also for their ability to handle and size up people. It may also mean the need for complete courses of training in mental hygiene work for foremen in the plant to the extent that time can be spared for such courses. I must emphasize here, if nothing else is done, the foremen should learn to recognize that fatigue, worry, and even the inability to get up in the morning to go to work are caused by mental problems of one sort or another, and that the sufferer should not be treated as a "bum," "faker," or as lazy.

4. Treatment by a Medical and Personnel Combination

MUCH of the psychological treatment of truancy will devolve on the shoulders of the personnel department. It is unfortunate in many plants here in the Detroit area, and I am sure this is true elsewhere, that personnel officers hold positions of responsibility who are mentally unable to do the work, who are inexperienced in dealing with factory workers, who are temperamentally unfit for the patient intrapersonal delving that is necessary to do good personnel work, and who lack ingenuity even to copy the successful procedures used in other plants. I am afraid that there are no longer any skilled industrial psychologists and psychiatrists available for such tasks, but a few can be found to act as consultants. They at least can select and train competent personnel people, and the physician, if he is in a position to do so, can urge upon his plant management the need for highly developed, well trained, and scientifically minded personnel departments.

In my opinion, any personnel official who is worth his weight must have certain minimum qualifications, and without them the plant can only deal with its men as though they were machines and not individuals. These qualifications do not rest on degrees or academic training, but there is an irreducible minimum that the personnel man must have. Besides being an enthusiast who gets along with both the bosses and the men, he should know psychological selection methods, the studies made on fatigue and those of Roethlisberger and Dixon, and he should certainly know basic mental hygiene. Unfortunately, there are still some plant physicians who themselves are not acquainted with this literature and are at as great a disadvantage as the kind of personnel worker whom I criticized above. But to do anything with the mental factors in truancy which I have emphasized, top-notch psychology must be practiced—it's too late now for hit-and-miss or trial-and-error methods.

It would seem that the government could set up a regional course, with competent psychologists and personnel men to go from plant to plant to give guidance where needed and a by-pass when not needed. I would even raise the question why a continuous advanced course in personnel psychology has not been established.

The first place that the personnel department can function is in the selection of employees. When workers are not readily available at times, plants may be required to take every kind of employee that they can lay hands on. This means that there should be consultants for the problem employee, and whether it be the personnel or the medical department is a matter for mutual agreement. When the worker is worried or has something on his mind, there should be someone in the plant to whom he can go and who can help him to solve his problems. For example, it may even be necessary, if the shopping problems get too severe, to have a shopper under the supervision of the personnel manager to make sure that food and other supplies are available to the worker. It would certainly be well to do as some of our Detroit plants have done, to provide someone in the personnel department to aid in the solution of transportation and housing difficulties. Only too often do we get the complaint from workers that management is not interested in their problems. Complaints they make about conditions in the plant even through the union are met indifferently by those higher up, because they have no one available for the solution of personality and emotional problems.

Some plants, particularly one which successfully employs several thousand workmen, have induction ceremonies which are very important in correcting the condition where the worker feels that he does not amount to anything. The worker is received so as to show that he is a very important person. Interest is taken in his affairs. Potential problems are ironed out before he or she is actually assigned to work. A beauty parlor is provided, at least in one plant, so that a woman knows that if she gets grimy or untidy at her machine, her hair and nails and grooming are going to be cared for at the plant's expense. All this gives an uplift to her ego. In addition, she is shown moving pictures disclosing how important the work is that she is going to do.

In another plant the personnel division takes workers through the plant to show them just where the part on which they are working finds its place in the production of war machinery. Even the man who runs a screw machine may see exactly why his little part is essential in the proper functioning of a great bomber.

The worker is told about plant conditions, and, if the work seems a little menial, the essentialness of even this menial work is shown to be necessary as a matter of preserving the good health and safety of other employees. Only too often we found absenteeism among workers who felt that cleaning a rest room was not essential war industry, and that they could take their time off whenever they wanted.

In addition, the worker might very well be introduced to his foreman and machine, and the greenhorn

should be instructed by special instructors with a good knowledge of personality on the machine rather than by a hard-boiled supervisor. These instructors need to be specially selected and specially trained. Whether these days of great necessity for rapid production and the use of every labor element without delay will permit extensive training of such people is doubtful, but I believe that time taken for such training will be well worth the expenditure.

5. Incentive

PLANS for contests and rewards for consistent attendance and superior work should not be left out of the plans made in the personnel department with the consultant opinion of the plant physician. Money incentives are of little actual value,[9] particularly if they seem to be eaten up in taxes.

Workers should not be "docked" if they report incipient ailments to the physician as soon as they are observed. In addition, trips to war camps and to recreational centers, first, as a means of relaxation and, second, as a means of convincing the worker that his labor is worthwhile should be provided for as soon as the transportation system of the country can take on this additional load.

The time may come when the rationing of certain foods equally distributed through all parts of the country to everyone will provide too little food of some particular type, meat or butter especially, for the industrial worker. The heavy worker could be provided with a bonus in the factory restaurant, particularly if he is consistent and a good worker.

Differential pay or bonuses may act as a stimulant, especially if the money can buy things, but it will need the utmost in union cooperation in devising plans that will be fair and will also act as an incentive. These schemes will vary from time to time and even though they are really the responsibility of management rather than the personnel department, but the union must be the court of last resort. The personnel department might bring to the attention of the union-management joint committees the need for such schemes if they are at all feasible (it goes without saying that the personnel man should be *persona gratissima* with the union).

This would, first of all, prevent a differential in rationing such as they have in England where the coal miners get twice as much meat as other workers. This is undemocratic and often unfair, but it does act as somewhat of an incentive. I believe, too, that more workers with minor ailments, particularly in this present borderline physical group that is coming into the factories today, might well be provided with special diets at noontime without giving offense to other workers or too much expense to the company.

Perhaps schemes of encouragement such as the giving of the government "E" serve a purpose, but I think this has been overdone. I am personally of the belief that various grades of governmental honor should be given individuals as a spur, and plant certificates and even medals for outstanding industrial behavior would be in order here.

The personnel department should also try to classify workers in terms of the kind of work that they can do both physically and mentally, and thus give each a chance to qualify. This will require close coordination with the physician.

I question whether contests within a department will be successful, but attendance conflicts between plants or departments are good prods. Andrew Court[3] says that merely posting the attendance records of all the men in the department in the foreman's office has a salutary effect.

6. Punitive Effort

AS A PSYCHIATRIST who has devoted a great deal of time to criminology, I question whether punitive efforts such as those suggested to Congress from time to time would be the means of solving the problem of industrial truancy. Certainly it will serve some purpose to have a law to hold over the heads of the egocentrics and the minor mental defectives which could be applied in the case of deliberate criminal truancy. Most truancy will be cured by finding the cause of the individual's industrial maladjustment and adjusting him to the plant or, if he needs to be removed from the plant, putting him in a place where he could be more useful to the war effort. This implies that the draft should not be used as a threat. If a man absents himself over a certain number of days he should not be drafted, but if he will be a better soldier than workman—which probably is doubtful—he may be used in the Army. Certainly the egocentrics that I have observed who have been the worst truants would not be acceptable at any Army induction station, so it can be seen that this gesture of threatening men who are chronic absentees with induction will not have the effect for which we might hope.

A law with an imprisonment threat in it has the value that it emphasizes to the worker how seriously society regards this problem of his being away from his bench. There are dangerous implications on how the law will be applied which give rise to the same problem that criminologists find with all new laws that are means as bludgeons—usually they fail or do grave injustices. Communities differ, plants differ, and individuals differ. One man might profit by being sent to jail, even if it were only to rest up from fatigue, while another man's productivity might be completely disarranged by the disgrace of jailing him for being away for a reason that to him seemed extremely important but to some casual observer or some administrator appeared to be inexcusable.

We have solved the problem of differentiating between individuals in the application of a law in our criminal courts by having psychiatric clinics connected with them. Personnel will not be available for such clinics in our plants in industrial areas until after the war. Probably a fillip would be given to attendance records shortly after the law became effective, but I would urge that before any such law is passed every means of education, exhortation, and personnel administration be tried. When a community is ready for such a law after being educated and trying other means, and the worker understands the meaning of the law, the worker himself will demand it in order to punish the man on the bench beside him who egocentrically ruins the records of the department or plant.

These recommendations do not conclude all the possibilities that there are for treatment of this problem, but they suggest some of the major approaches.

Conclusion

IT MUST not be forgotten that this whole problem is extensively involved and that it has a psychological base that cannot be removed by threat or edict. I have barely touched on some very important factors. There are differences in different areas, in different plants and in the interpersonal relationships as well as in the personality and make-up of the industrial truant which need to be handled far more than the problem as a whole. The physician is in an important position in solving the problem for he can not only practice preventive medicine to keep the men at work, but can also initiate needed mental health programs as suggested above which will be of marked assistance in dealing with many of the non-medical aspects of truancy.

[AUTHOR'S NOTE: Although most of the material for this study was obtained from interviews in and out of the Psychopathic Clinic of Recorder's Court and the Traffic Clinic of Recorder's Court, I am indebted for suggestions, aid, and data to the following: ANDREW T. COURT, General Motors Corporation; PAUL STE. MARIE, President, Ford Local No. 600, UAW-CIO; FRANK MARQUART, Education Director, Ford Local No. 600, UAW-CIO; Educational Flying Squadron, Ford Local No. 600, UAW-CIO; ALEXANDER GLENNIR, UAW-CIO; ALLON PEEBLES, Canadian Ministry of Labor; DON E. WRIGHT, N. A. Woodworth Company; CHARLES ESCHENBACH, Chrysler Corporation; MONTAGUE A. CLARK, War Manpower Commission; and CLARENCE E. WORMUTH, Detroit Industrial Safety Council.]

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Nethacetin

—In the Management of Primary Dysmenorrhea—

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THE number of young women employed at the present time in industry brings out the fact that primary dysmenorrhea presents a difficult problem in the maintenance of industrial efficiency. The difficulty of the problem is increased by the fact that the causes of painful menstruation are not clearly understood.

It is evident that the basis for painful menstruation lies in abnormal contractions of the uterine musculature, which produce the cramp-like pain. It seems logical, therefore, that if a therapeutic agent would be found that would inhibit or abolish uterine contraction and yet not interfere with normal menstrual function, it would be of valuable assistance in the management of primary dsymenorrhea.

Recently Becker and co-workers[1] have reported the development of a new sympathomimetic amine, methylethylamino-phenylpropanol (Nethamine brand) hydrochloride, also known chemically as l-N-ethylephedrine hydrochloride. Particularly interesting is the report of its effect upon the uterus of the laboratory animal. Nethamine hydrochloride was found to increase the tone of strips of uterine muscle, but diminished or inhibited the individual contractions. By comparison, ephedrine, to which this drug is related, was found to increase the tone of uterine musculature but did not as competely suppress the individual contractions.

This new drug has pharmacological action similar, in general, to ephedrine but it does not have the pressor or central stimulant action of ephedrine. Craddock[2] has reported that clinically it does not have the troublesome side-actions of ephedrine or epinephrine.

On the basis of pharmacological studies, Nethacetin,* a tablet composed of Nethamine hydrochloride, 2/3 grains, acetophenetidin, 3½ grains and acetylsalicylic acid, 2 grains, was furnished for investigational use in the symptomatic treatment of primary dysmenorrhea.

This tablet was used in an industrial group for a period of several months in 113 patients suffering with dysmenorrhea. The entire group comprised young unmarried women under 21 years of age, with a diagnosis of primary dysmenorrhea. One tablet was given with hot water and the patient was instructed to lie down. The dose was repeated every hour until pain and discomfort had ceased, at which time the patient was allowed to return to her work. The average dosage requirement was as follows: 45 required one tablet for relief; 41, two tablets; 4, three tablets and 5, four tablets. The medication was used at the onset of cramping. The only adjunctive treatment used was heat to the lower abdomen by means of a hot water bottle.

Of this 113, reports were not obtained from 18, leaving 95 to be included in the final summary. Of these, 81, or 85.3%, obtained relief as follows: 18 were relieved within a half-hour; 7 within 45 minutes; 40 within an hour; 11 within an hour and a half; and 5 within three to five hours.

In order to determine whether the Nethamine in the compound was really the factor bringing about relief, we decided to treat this same group with a specially prepared tablet, identical in appearance with the Nethacetin tablet containing, however, only acetophenetidin, 3½ grains and acetylsalicylic acid 2 grains. Thus the tablets used as control contained the two analgesics in the same amount as the experimental tablet, but contained no Nethamine. These control tablets were given in the same manner as the original.

In the meantime, the nurse in the medical department who distributed the tablets and kept records on the original study was replaced by one who knew nothing of the previous data. The patients did not know they were receiving different medication, since the tablets were identical.

Results were uniformly not as satisfactory with the the plain aspirin-phenacetin combination as those obtained with the new drug incorporated in the formula, as noted by complaints of the patients and an increased period of time lost from work. We felt this data was unbiased, since neither nurse nor patient knew of the change in medication.

This drug seems in this preliminary test to have definite value in the symptomatic treatment of primary dysmenorrhea and to be useful in preventing absenteeism in industries that employ large numbers of women.

SUMMARY: (1) A new sympathomimetic amine, methylethylamino-phenylpropanol (Nethamine brand) hydrochloride has been shown experimentally to diminish or completely inhibit uterine contractions.

2. Incorporated with acetophenetidin and acetylsalicylic acid in tablet form, it was used to relieve dysmenorrhea in a group of young women employed in industry. Of this group 85.3% were relieved.

* Brand of sympathomimetic anodyne, furnished for this study by The Wm. S. Merrell Company.

3. As a control, identical tablets containing the same amounts of aspirin and phenacetin and no Nethamine were administered to this same group. Results were not nearly so successful as when the tablet containing Nethamine was given.

4. It appears from this preliminary report that this new compound may be useful in the management of primary dysmenorrhea and that it will serve as a practical means of reducing absenteeism among female industrial workers.

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Trends in Occupational Disease

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Disease which is directly the result of exposure to an industrial hazard may be termed an occupational disease. From the medical point of view occupational diseases are those which may reasonably be attributed to occupation. Laboratory research and clinical and experimental investigations are constantly helping to clarify those illnesses which may be deemed industrial or occupational in origin. That certain occupations may have injurious effects upon the physical condition of the worker has long been recognized. Since the time of Ramazzini,[1] the medical profession has had a splendid guide in the appreciation of the hazards in various industries in relation to health and disease. The awakened interest of the medical profession in this state in occupational disease has been due in a large measure to the change in the occupational disease law enacted in 1935, and more recently to the increased industrial tempo associated with the war effort. Prior to 1935, in this state, specific industrial hazards were named as responsible factors for occupational disease, if such disease arose during the course of occupation. Section 28 was added, making any disease which could be attributable to occupation compensable.

The responsibilities of bringing to the profession, the medical student and the graduate physician, information in industrial medicine and occupational disease are recognized by those charged with the responsibility of continuing to keep American medicine on the highest plane.

In a recent publication,[2] the U. S. Department of Labor listed over 1100 occupational hazards. It would be beyond the scope of this presentation to discuss the various specific industries, specific hazards and their possible effects upon the human economy. The increase in the incidence in occupational disease in the State of New York from 1935 to 1939 is shown in the following:

TABLE 3.
Number of Compensated Disabilities Due to Harmful Substances

Year	Number of Cases of Occupational Diseases	Accidental Injuries Due to Harmful Substances	Total
1935	695	826	1521
1936	984	898	1882
1937	1414	939	2353
1938	1441	925	2366
1939	1522	874	2396

Text of Dr. Gray's Lecture at the November 4, evening session, of the Post-Graduate Course in Industrial Medicine at Long Island College of Medicine, November 2-13, 1942.

The table amply illustrates the increasing incidence of occupational disease. An important factor in this increase has been the recognition of occupational disease by the physician and the appreciation of the part that industrial exposure may play in physical disability. It becomes the part of the physician to obtain a thorough occupation history, not only of the present employment but also of all past employment. In any case of suspected poisoning due to an industrial hazard information relative to the chemical used by the worker can be secured either through the employer or the Division of Industrial Hygiene of the State of New York Department of Labor. A knowledge of all previous occupational hazards is essential in the evaluation of occupational disease. This can be illustrated by the following: A male adult, 35, was found to have an aplastic anemia. During the four months prior to his present illness he had been a garage mechanic. Investigation revealed that in his present employment he at no time came in contact with benzol or any other agent that could be held responsible for the aplastic anemia. On inquiry into his past occupational history it was found that for 14 months prior to his present employment he had been exposed to the absorption of benzol in his work. It was reasonable to believe that the aplastic anemia was due to this contact in a previous employment.

Similar instances indicating the importance of obtaining a complete history of all past occupations can be multiplied, but the lesson is obvious.

At this time a word of caution on relating illness to industry must be introduced. As physicians, we are cognizant of the fact that there is no parallelism between symptoms and disease. Individuals with psychosomatic or functional disorders may have many symptoms but upon complete examination are found to be entirely free of disease. We also know that disease may exist without clinical symptoms. Diseases of the cardiovascular system, genito-urinary tract, gastro-intestinal tract, hematopoietic system, broncho pulmonary system, nervous system, skeletal system, etc., may exist without producing clinical symptoms. Attention is directed to a consideration of disease that may be discovered on examination of an individual presumed to have an industrial or occupational illness. It is evident that before arriving at a diagnosis that a specific hazard in industry is responsible for an illness, a thorough and careful study is essential in every instance. These "silent" diseases enumerated above may exist for months or years until some incident brings the patient to the office of his physician. An industrial accident, illness or occupational disease may act in the nature of revealing underlying disease. If the occupation is responsible for some of the symptoms it becomes the duty of the physician to determine what part the specific hazard in an occupation plays in the clinical picture and whether or not the underlying disease which has been discovered is in any way affected. Just as we have learned that there may be no relationship between disease and clinical symptoms so we have learned to recognize that there may be no parallelism between pathological findings and clinical symptoms.

It seems evident, therefore, that in order to obtain accurate knowledge as to whether an industrial illness is responsible for disability, a pre-employment or pre-placement physical examination is of the greatest importance. Since the occupational hazard that may exist is known, and the effect of such hazard has been established through both clinical and experimental study, the symptoms and abnormal findings in any given case can only be properly evaluated when the physical condition of the patient prior to employment is known.

A thorough physical examination, x-ray examination of the chest and Wassermann study should be routine procedures. When there is a specific hazard in the industry, blood studies or other laboratory examinations may be essential both prior to and during regular employment. Those individuals exposed to the possible absorption of inorganic dust containing silica or asbestos dust require periodic x-ray examination of the lungs. The hazard of a specific occupation is the determining factor as to the type of medical survey necessary in order to recognize the earliest manifestations of industrial illness. The incidence and severity of illness in any type of industry depend not only upon control and prevention of disease but also upon the early recognition of disease.

Occupational diseases, as revealed by the statistics of the New York State Department of Labor, may be divided into the following groups:[3] (1) Dermatitis; (2) poisons; (3) abnormalities of air pressure; (4) infection; (5) dust.

Dermatitis

INJURIES to the skin are the most frequent of all cases of occupational disease. Schwartz and Tulipan[4] estimate that the proportion of dermatitis to all other occupational disease is 69%. The handling of cement, and contact with dyes, chemicals, oils, solvents, metals, etc., are known to produce dermatitis, especially in susceptible individuals. The mechanics of allergy in relation to contact dermatitis are still a moot question despite the intensive efforts of many investigators.

In order to establish proof of the occupational nature in a case of dermatitis, Sulzberger and Finnerud[5] have listed certain criteria which are of aid. Their criteria are as follows:

A. CRITERIA OF THE FIRST ORDER.

1. Inception: The dermatitis appears at any time during a period of industrial exposure or even after a lapse of a reasonable incubation period following the cessation of the industrial exposure (usually a maximum of from two to three weeks).

2. Amelioration: The dermatitis regularly disappears or is repeatedly improved within a reasonable period (days, weeks or even months) after cessation of the causal industrial exposure. (While this is usually the case, retention of causal agents, complications or ensuing polyvalent sensitization may prolong the course even for several years after the last industrial exposure.)

3. Recurrences and Exacerbations: The dermatitis shows a tendency repeatedly to recur or to exacerbate when the worker returns to the identical industrial exposure after a certain period of absence (provided there has been no change in working conditions or in the patient's manner of working or in his susceptibility).

B. CRITERIA OF THE SECOND ORDER (Adjunct Criteria).

1. The dermatitis appears first in, and is usually confined to, the areas of maximum exposure (in a small percentage of cases it spreads to or may begin in apparently unexposed areas or even becomes generalized).

2. The character and localization of the dermatitis correspond to the character and localization of dermatitis known in other cases to have been caused by exposure to the same or similar industrial hazards. (While many different substances and procedures can produce similar or identical eruptions, there are certain classes of substances and of procedures which regularly produce fairly characteristic lesions.)

3. The application of the presumptive causal agents to an unaffected site close to the site of the dermatitis produces a reaction, provided this application is made during the active phase or after the proper interval following the cessation of the dermatitis.

4. The cutaneous tests produce reactions of the same fundamental nature as the dermatosis under investigation.

5. Other workers similarly occupied are or have been similarly affected.

6. The dermatitis appears soon (days or weeks) after the patient begins work involving new potential hazards.

7. The dermatitis is proved to be of possible occupational nature; that is, it is shown to be of the type which may result from the industrial exposure sustained.

In this connection it must be determined that the dermatitis under consideration is not a non-industrial eruption of such dermatoses as seborrheic dermatitis, psoriasis (including pustular psoriasis, parapsoriasis, lichen planus, dermatitis herpetiformis, multiform erythemia, certain types of non-industrial fungus and other infectious processes, non-industrial drug eruptions, herpetic eruptions, nevoid and other anomalies of the skin, non-industrial dermatitis exfoliativa, circumscribed neuro-dermatitis, atopic dermatitis and particularly non-industrial contact-type dermatitis. (It must, however, be borne in mind that the presence of a non-industrial dermatosis by no means excludes the possible co-existence of an industrial dermatitis. Moreover, the existence of a non-industrial dermatosis may pre-dispose to industrial dermatitis; and, on the other hand, industrial exposures may elicit attacks, prolong the course or produce exacerbations of such non-industrial dermatoses.)

The physician must recognize the fact that there are certain skin disorders, such as psoriasis, scabes, impetigo, etc., that are not related to occupation. The use of the patch test in evaluating the question of occupational dermatoses must necessarily remain in the hands of the specialist.

Poisons

OCCUPATIONAL diseases due to poisons occupy the second place in frequency of industrial illness for which compensation was paid in the State of New York. Occupational illness was due most frequently to lead (excluding dermatitis). Poisoning by benzol was next in frequency. Other causes of poisoning listed were petroleum products, poisoning by carbon monoxide, sulphuric acid, hydrochloric acid, poisoning by formaldehyde, "dope," carbon disulphide, arsenic, mercury and zinc.

A. Lead poisoning is the most frequent of the occupational diseases. Lead enters the system most frequently either by way of the respiratory tract or the gastro-intestinal tract. Absorption of lead through the unbroken and normal skin can occur among those who handle tetraethyl lead. The behavior of lead, irrespective of the mode of entrance, when it produces intoxication is similar in most instances. In a study of 50 patients with acute lead poisoning,[6] the symptoms in order of frequency were listed as follows: Epigastric pain, constipation, colic, weakness, loss of weight (average loss 18 pounds), arthralgia (elbows, knees, shoulder joints, wrists, ankles), loss of appetite, myalgia (arms and legs), "bad taste" in mouth, vomiting, numbness (extremities), sleeplessness, nausea, headache, nervousness, backache, impotence.

On physical examination the pertinent findings were pallor, lead line on gums (in patients with poor oral hygiene), epigastric tenderness, cecal tenderness and sigmoid spasm.

The paucity of positive findings on physical examination was striking. A detailed history of occupational

exposure, the clinical interpretation of the symptoms and the finding of an abnormal amount of lead in a litre of urine and in the whole blood and the presence of an abnormal amount of stippling of the red blood cells is essential for diagnosis.

B. Benzene (benzol) is a coal tar derivative which is used largely in industry because of its property as a solvent. The primary effect of benzol upon the hematopoietic system has been recognized as an industrial hazard, following the observations of Santesson.[7] A depression of function of all the bone marrow elements (red blood cells, white blood cells and thrombocytes) leading to aplastic anemia is well recognized. The pattern of the blood picture, however, may vary as does the individual sensitivity. Although the usual picture of benzol poisoning is that of aplastic anemia,[8] Mallory and his co-workers,[9] and also Rhoades and Miller,[10] have called attention to the fact that hyperplasia of the bone marrow may follow absorption of benzol. This substance is absorbed through the respiratory tract and also by the skin. There may be latent or delayed effects indicating that this solvent (benzol) may initiate alterations in the bone marrow which may continue to be slowly progressive.

The derivatives of the benzol ring are numerous and are industrially important. The nitro and amido compounds may produce varying effects, and it is recognized that the amido compounds may cause bladder tumors which may be benign or malignant. In a recent survey on the effects of exposure to toluene in industry, Greenburg and Mayers,[11] and their co-workers, concluded (in a study of 106 painters exposed to the inhalation of toluene of between 100 and 1,100 parts per millon for periods ranging from two weeks to more than five years) that "Industrial exposure of human beings to toluene resulted in enlargement of the liver, macrocytosis, moderately decreased levels of erythrocyte counts and absolute lymphocytosis; such exposure did not result in leukopenia; early chronic toluene intoxication in man is best evidenced by hepatomegaly and macrocytosis."

More recently Witkowski and his co-workers,[12] reported on industrial illness due to tetryl. This substance is similar to trinitrotoluene. Investigations emphasized that anyone working in a tetryl building is subject to illness. Dermatitis may occur, but attention is called to a rapidly developing anemia, increased irritability, and anorexia among the workers exposed to the inhalation of this substance. There are many substances derived from the benzol ring, including drugs and dyes, whose effects are entirely different from its parent substance, benzene (benzol).

C. The derivatives of petroleum are used on a large scale in industry because they are both volatile and have an avidity for fats. In the group of petroleum derivatives the chlorinated hydrocarbons occupy a prominent place in industrial use. They are used as refrigerants, as solvents for rubber and as degreasers. Although the action of carbon tetrachloride is known to the profession because of the use of this substance in the treatment of hookworm disease in man, it should be remembered that the absorption of this through the lungs is different from when its action is ingested. Inhalation of these chlorinated hydrocarbons produces an anesthetic action, but, if exposure is prolonged, liver damage and gastro-intestinal disturbances may occur. With removal of the individual from his occupation the changes may be reversible. If, however, serious liver damage results, acute liver atrophy may follow. In some instances renal injury may occur and prove fatal. In these war days attention must be called to the use of a petroleum derivative, tetrachlorethane ($C_2 H_2 Cl_4$), sometimes called acetylene tetrachloride. It is the best solvent for cellulose acetate which is used in applying a coating (dope) to the wings of airplanes. The absorption of tetrachlorethane is not uncommonly followed by acute atrophy of the liver.

D. Arsenical poisoning has been known to the physician because of the instances of liver damage that arose following the use of the early preparations of neoarsphenamine in the treatment of syphilis. In industry the occurrence of skin lesions following poisoning from white and green arsenic has long been recognized. Exfoliative dermatitis and liver damage are probably the most common expressions of arsenic poisoning. Several such instances of exfoliative dermatitis and mild hepatitis occurred in a group of workers who used larger amounts of arsenic than usual in an insecticide mixture.

E. Mercurial poisoning is manifested in industry either by inflammation of the mouth, muscular tremors or psychic irritability. Among those who work in the hat industry there may occur the so-called "hatter's shakes." This is a typical intention tremor, increasing with effort in attempting to control the tremor and greatly decreasing when the individual does his accustomed work or when he is not being observed. The pronounced gastro-intestinal symptoms and renal changes seen in acute poisoning are seldom encountered in industry.

F. Carbon monoxide poisoning is always acute, and is spoken of as an occupational accident rather than an occupational disease. Symptoms of mild intoxication are manifested by nausea, vomiting and varying degrees of headache. The combining power of carbon monoxide and hemoglobin is between 200 and 300 times that of oxygen and hemoglobin.[13] The effect produced by carbon monoxide is due primarily to the lack of oxygen, and the symptoms are those of anoxemia. The lack of oxygen induces excessive breathing and as a result there is an excessive loss of carbon dioxide, and there may be failure of respiration. Although carbon monoxide is readily taken up by the hemoglobin the combination is unstable and, if deep unconsciousness has not occurred, the carbon monoxide will disappear from the blood after adequate therapy, depending upon the degree of absorption and the degree of unconsciousness. Recovery may be complete, although in some instances there may be a residual bronchitis, some nervous defect and disturbance of vision or speech. The question as to whether carbon monoxide can act like a cumulative poison and whether there is such a thing as chronic monoxide poisoning is still a matter of dispute. In discussing the pathology of carbon monoxide asphyxia, Drinker[14] states that it is the degree and extent of the localization of capillary hemorrhages which undoubtedly determine the clinical course and symptoms that may follow carbon monoxide poisoning. This author discusses the findings of Hill and Semerak,[15] who studied the brains of 32 individuals who died as a result of carbon monoxide asphyxia. They concluded that the characteristic changes of poisoning such as those seen in the lenticular nucleus occurred more readily in the presence of antecedent vascular disease. In their opinion the blood vessels bear the brunt of the damage in carbon monoxide poisoning.

G. The inhalation of gases or vapors such as sulphur dioxide, hydrochloric acid, sulphuric acid, etc., produces irritation of the mucous membranes of the tracheo-bronchial tree. The degree of change depends primarily upon the amount of gas inhaled. As long as the individual remains conscious and the gag reflex is present the changes in the pulmonary parenchyma and bronchial tree may not be severe. If, however, unconsciousness occurs and the individual inhales a great deal of the gas, serious changes may occur in the lungs.

Abnormalities in Air Pressure

IN THE year 1939, 24 individuals in this state received compensation because of compressed air illness. In the building of tunnels, laying of foundations, etc., it becomes necessary for work to be carried on under increased air pressure in order to prevent entrance of water into these excavations. Workers who enter the compressed chamber are exposed to a gradual increase in air pressure at short intervals. Usually there are no subjective complaints during the time the individual is working under the increased pressure. If the air is too quickly compressed hemorrhage may occur. The greatest danger lies in hasty decompression after removal from the place of increased atmospheric pressure. During compression the blood and tissue juices dissolve in increased amounts of air. If there is too rapid decompression gases are released and bubbles of nitrogen are formed, cutting off oxygen by blocking the capillaries and causing symptoms of compressed air illness ("bends"). The severe pain in the abdomen and extremities, in the joints and muscles, painful pressure in the chest, monoplegia, paraplegia, dyspnea, vertigo, etc., may persist for a varying degree of time, depending upon the severity of the illness.

Attention should be called to the fact that there are dangers attached to decreased atmospheric pressure as well as to increased atmospheric pressure. Exposure to decreased atmospheric pressure has a profound effect on health. The physiological changes which occur are chiefly due to lack of oxygen (anoxia). The term used for the resulting condition is "altitude sickness." Altitude sickness may be acute, owing to rapid ascent or prolonged stay at high altitude, or chronic, due to the cumulative effect of repeated prolonged exposure to minor degrees of oxygen want. Furthermore, as the external air pressure on the body decreases, the internal pressure must decrease if the body is not to burst. In extreme conditons of decreased pressure and rapid ascent, the internal gases of the body will expand and eventually, at altitudes of 30,000 feet or over, dissolved air bubbles will form in the blood vessels and tissues as in compressed air illness ("bends"). "Aeroembolism" is the term given to this condition in aviation medicine. Disturbances of the middle ear are common among flying personnel, owing to rapid changes in altitude and pressure. The lowered partial pressure of oxygen in the inhaled air at high altitudes has also a dangerous indirect effect in that it may render the individual more susceptible to carbon monoxide gas should this be present in the pilot or passenger compartment. Low concentrations which would be considered safe at normal atmospheric pressure are capable of causing anoxemia and asphyxia at high altitudes, owing to the progressively decreasing oxygen saturation of the blood under these conditions.

Infections

INFECTIONS causing illness as a result of industrial exposure are not common. Anthrax is probably the most frequent of all infections which have been judged to be occupational in origin. Intestinal anthrax is not an industrial hazard. Internal or pulmonary anthrax is not associated with any external lesion and is usually rapidly fatal. The usual picture of anthrax is that generally described as a "malignant pustule," usually located about the face and neck, and is complicated by regional lymph adenopathy. It may occur in individuals engaged in wool sorting, in wool workers, or in animal handlers, etc. Undulant fever (brucellosis) may occur in dairy workers, milk inspectors, veterinarians. Fungus infections may be either local or systemic and are usually of mild clinical importance, although occasionally they may produce disease of the lungs. In an instance that came to the writer's attention tularemia occurred as a result of an incised wound of the finger while skinning an infected rabbit.

Dust

FOR practical purposes industrial dusts have been divided into two classes, organic and inorganic. Organic dusts contain carbon and are found in the textile dusts, flour, sugar, wood, etc. These dusts may irritate the skin, causing an occupational dermatitis or, if present in large concentration, may cause irritation of the upper air passages. They do not cause pneumoconiosis or pulmonary fibrosis of a specific disabling nature. The particles are usually not of the size to permit them to penetrate to lung tissue. Those which do gain entrance are usually absorbed. Coal is sometimes classed with the mineral dusts. It is organic in composition and does get into the lungs, causing pigmentation, but it does not produce a disabling pneumoconiosis. The so-called "miner's asthma" of the anthracite miner has been shown to be in fact a silicosis. The changes in the lungs and the clinical symptoms, shortness of breath and asthma, are due primarily to the free silica present in the coal that is being mined, and the process in the lungs is primarily a silicosis but is spoken of as anthraco-slicosis.

The inorganic dusts are mostly mineral or metallic in origin. Only those containing free or uncombined silica produce the specific pneumoconiosis known as silicosis. The action of the silica dust upon the lungs is shown to be chemical.[16] The silica particles producing nodulation and fibrosis are usually small in size and vary from one half to three microns in diameter. The production of symmetrical bilateral miliary nodulation with occasional confluence of these nodules producing conglomerate nodulation is characteristic on x-ray examination of the lungs. It has been shown that infection, usually tuberculosis, may complicate the advanced case of silicosis. The dusts that contain silica in combined form do not cause silicosis with the exception of asbestos, a magnesium silicate which produces a characteristic fibrosis. Animal experimental study indicates that the asbestos action is probably mechanical.

In the prevention of silicosis and asbestosis medical engineering supervision is important. The use of exhaust systems or suction devices; the use of water, and occasionally oil, to keep dust out of the atmosphere; the use of enclosed systems to prevent dust; increased ventilation and the use of helmets or respirators are recommended.

IN THIS discussion of industrial illness description of specific occupational diseases has necessarily been brief. The recital of some of the occupational diseases has been omitted. The time allotted for this presentation does not permit of a more comprehensive review or consideration of treatment. Attention has been called by Gafafer[17] to the fact that "certain elements characterizing more or less the environment outside of his work place may be of significant influence on the worker's health." Attention is directed to an interesting article by Dr. Fielding H. Garrison[18] on "Life as an Occupational Disease." Dr. Garrison reviews the early literature on occupational disease and then proceeds to discuss the concept of disease as a physiologic adjustment or occupation. The constitution of the individual, certain factors outside of his work, may all play a part in the presentation of the clinical syndrome. The diagnosis of an industrial illness or occupational disease depends upon many factors. Upon the physician rests the responsibility of its early recognition, so that prompt treatment may be instituted in order to restore the individual to health.

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Trinitrotoluene (TNT)

—Its Effective Removal from the Skin by a Special Liquid Soap—

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THE complete removal of trinitrotoluene (TNT) from the skin is difficult but it is of primary importance in protecting the health of exposed workers.

The purpose of this article is to describe a liquid soap which has been developed and used for the specific purpose of effectively removing TNT from the skin. It is felt that the general use of such a soap will materially reduce the incidence of TNT poisoning. The product can still be improved. It is hoped that this article will stimulate further cooperative efforts between those in munition plants interested in health protection and soap manufacturers in the development of an even more effective TNT remover.

There is evidence that TNT is much more readily absorbed through the skin of some individuals than of others. This may account in part for the great variation in susceptibility of individual workers to the toxic effects of TNT. In the process of manufacturing TNT and loading it into shells and bombs, the worker is frequently brought into intimate contact with finely divided powder.

Skin Absorption Important

WHILE toxic effects may arise due to inhalation or ingestion of the finely-divided dry powder, fumes or vapor, an important mode of entry is through the skin. English workers[1, 3, 4] conclusively demonstrated this during the Great War. This knowledge induced good housekeeping, which resulted in a great reduction in the incidence of toxic effects and fatalities. However, TNT must be handled in huge quantities by many workers in times such as the present, and in many of the processes it is impossible completely to eliminate exposure by any practicable means.

Proper Ventilation and Protective Clothing

EVERY effort should be made to improve methods of handling this material to decrease exposure. Proper ventilation should remove a maximum of the dry powder, fumes or vapor at the source. Protective clothing should be worn at all times. In spite of these efforts, however, it is found that relatively large amounts of TNT are deposited on hands, faces, ankles, and bodies of exposed workers in manufacturing and shell loading operations. With the amount of exposure frequently encountered, washing with ordinary soap and water is entirely inadequate. In such cases the worker continues to absorb TNT over a 24-hour period seven days a week.

Webster Skin Test

DURING the Great War, Webster developed a test for indicating the presence of even small quantities of TNT on the skin. The reagent is made by adding one part by volume of saturated stock solution of sodium hydroxide in absolute alcohol to nine parts by volume of absolute alcohol. The test depends for its action upon the fact that when TNT comes in contact with alcoholic sodium hydroxide, a deep purple color is produced. This color gradually changes to a dark brown upon exposure to the air and oxidation. A little cotton or gauze is wet with the reagent and wiped over the skin of the exposed worker. The worker who has washed thoroughly with the customary soap and water is surprised to find that the skin of his face, neck, hands, ankles, and other parts of the body still turns purple when the reagent is applied to these parts, because TNT is still present.

Psychological Value of Webster Test

THE psychological value of frequent tests of this nature is tremendous. It shows the worker that he must make greater efforts to reduce his contact with TNT, and also that he must wash more thoroughly. It also demonstrates to management the need for a more effective agent for the complete removal of TNT from the skin.

Even with good local exhaust ventilation which serves to keep the atmospheric concentration at a low level, the presence of TNT on the face can be demonstrated by the Webster skin test.

Other Uses for Webster Skin Test

DINITROTOLUENE (DNT) and tetryl are handled extensively in the munitions industry. The presence of DNT on the skin is indicated by a blue color and tetryl by a dark brown color when Webster's reagent is applied. The worker's clothing may be tested before and after laundering to determine the presence of any of these chemicals. DNT is easily removed, but this test may prove that the TNT workers' clothing is not being washed with sufficient thoroughness to remove all TNT.

While I have not tried the reagent on numerous other nitro-aromatic compounds, it is felt that the Webster reagent might give changes of color for very many of these.

As a number of these compounds—such as coal tar intermediates—are toxic and are absorbed through the skin, such a test would prove valuable in detecting their presence on the worker's skin.

Removal of TNT from the Skin

VOEGTLIN, Hooper, and Johnson,[2] did much work in trying to discover an inexpensive, harmless, and efficient skin wash, which might prove satisfactory

in removing TNT from the skin of the workers before leaving the factory. They experimented with 10% aqueous solutions of sodium sulphite, sodium thiosulphate, ammonium sulphide, sodium hydrosulphite, and others. Ten percent sodium sulphite seemed to be their most promising solvent. They found that after workers had completely washed with the regular soap and water, much TNT could still be removed by washing with 10% aqueous sodium sulphite. These results are demonstrated by means of the Webster skin reagent, and may be easily verified by anyone sufficiently interested to spend five minutes in performing the simple experiment.

It has been assumed by some individuals that pure TNT is insoluble in sodium sulphite because sellite (15% aqueous sodium sulphite) is used to separate pure TNT from its isomers, since the latter are much more soluble at the separation temperature. Pure TNT is less soluble in aqueous or soap solutions of sodium or potassium sulphite than are its isomers, but it is definitely soluble and many times more soluble than it is in toilet soap solution. This may be easily demonstrated by preparing pure TNT crystals and noting their disappearance in 10% sodium sulphite, together with the appearance of a brown color at the reaction surface of the crystals. The Webster reagent is positive for pure TNT, giving an intensive purple color; and we have used it to prove that pure TNT will go into solution and produce a color change, or, better still, that the special soap will actually remove pure TNT from the hands with much greater rapidity than will other methods. Voegtlin, Hooper, and Johnson,[2] give the solubility of 2, 4, 6 TNT in 10% aqueous sodium sulphite as .0828 grams per 100 cc. at room temperature as compared with .0010 grams of liquid soap solution of concentration 5 cc. to 100. This comparison would indicate that commercial TNT is 80 times more soluble in 10% sodium sulphite than in liquid soap and water solution.

We have gone into some detail regarding the foregoing because the erroneous assumption that pure TNT is insoluble in sulphite solutions has done much to retard progress in the development of a good cleansing agent for TNT. The 10% aqueous solution of sodium sulphite was recommended for use on exposed parts, to be followed by the usual soap and water bath.

From a practical standpoint it is difficult to induce workers to wash thoroughly with one medium, and the use of two mediums further increases this difficulty. We, therefore, felt that it would be of value to try to incorporate agents for the removal of TNT in liquid soap.

DR. T. J. BULGER, at the Chickasaw Ordnance Works, attempted to incorporate 10% sodium sulphite in liquid soap.

We also tried this, but found that the two ingredients tended to form separate layers upon standing.

Potassium Sulphite

ONE of our chemists, MR. J. J. URBAN, suggested the substitution of potassium sulphite for sodium sulphite, as it was felt that the sulphite ions and not the base were responsible for the solvent action. He further assumed that this would go into solution, since liquid soap has a potassium base. Both assumptions were proved to be correct. Tests showed this soap to be very effective in removing TNT.

Disagreeable Odor Eliminated

A RATHER disagreeable odor is left for a few minutes after washing with the sulphite solutions. However, this has been almost entirely eliminated by the soap manufacturers.

Wetting Agents

IT WAS felt that because of the special property of wetting agents, they might prove of value in removal of TNT from the skin. Several wetting agents were added to liquid soap in varying percentages from 5 to 15%, and have proved to be just as effective in this respect as is potassium sulphite.

Potassium Sulphite and Wetting Agent

WE THEN asked the soap companies to incorporate both a wetting agent and potassium sulphite in a liquid soap. Since both of these agents tend to cause a thickening of liquid soap, some difficulty was encountered. Further difficulty was occasioned by the wartime shortage of cocoanut oil—the most used base for liquid soap. Substitute oils are being used, however, and by experimenting with a large number of wetting agents a very efficient soap has been produced. It is an excellent remover of TNT and leaves the skin in good condition. Several competing soap companies are experimenting with varying percentages (5 to 15%) of wetting agent, and of potassium sulphite 5 to 10%, and different liquid soap bases in an effort to develop the best possible product. The graduate student in chemistry might find this a most worthwhile problem for research.

Testing TNT Cleansing Agents

WE HAVE developed a very easy and simple method for testing the efficiency of various mediums in removing TNT from the skin. A saturated solution of TNT in acetone is prepared. If three soaps are to be compared, three individuals are selected, and each receives one-half cubic centimeter of the solution in the palms. This is rubbed all over the surface of the hands. The acetone evaporates rapidly, leaving a coating of firmly adherent TNT on the skin. The individuals then wash for exactly two minutes, each using a different soap. The hands are then tested with Webster's reagent. Using this method for testing a large number of toilet soaps, we have in all cases found that there was still a large amount of TNT left on the skin, as indicated by a positive Webster skin test. The best of the liquid soaps containing potassium sulphite and wetting agent will completely remove all TNT except that beneath the nail ends. This may be readily removed by use of this cleanser and a hand brush. The hand brush is of further use in decreasing the washing time required to remove TNT from the skin, and is supplied by our Works to each worker in TNT. The brushes are very inexpensive, and each employee has his name burned on the wooden back of the brush with a simple electric point.

When a soap salesman says he has a cleanser for TNT it is a simple matter, by using the above test, to compare his soap with the cleanser used. If the cleanser proves to be inferior in removing TNT, he is encouraged to have his company continue work to improve the soap along this line.

Soap as Color Indicator

IN REMOVING TNT with the sulphite soap a color change is produced as the TNT is dissolved. The soapsuds become brown, and this is of psychological value as it proves to the worker that the TNT, which would impair his health if left on, is actually being removed.

Tetryl Removal

WHILE the sulphite soap was developed to remove TNT, it has proved more effective in removal of tetryl than any other cleanser we have been able to find. The employees like it too, because a brown color

change indicates the removal of the tetryl, and because they get less staining of skin. Tests may prove it to be of value in removing other aromatic nitro and amino compounds from the skin.

Dermatitis

IT HAS been suggested that, since sulphite is a skin irritant to a small percentage of individuals, we might expect more cases of skin irritation than from the use of soap alone. We have used the special soap for several months and during this time our incidence of dermatitis among both TNT and tetryl workers has decreased appreciably. This is probably accounted for by the fact that TNT and tetryl are much more effectively removed by the cleanser, thereby lessening the possibility of skin irritation. For those with dry skin or dermatitis, a sulfonated castor oil soap is always available for use after washing with the special soap or as a substitute for it.

Washing Clothing Soiled with TNT

MOST plants assume that all TNT is removed from contaminated clothing by usual thorough washing methods. Routine check of washed clothing with the Webster reagent reveals that this it not true. Where the clothing is exposed to much TNT, a considerable amount may remain after the usual thorough laundry washing. Furthermore, unless care is used, clothes containing little or no TNT, when so washed with highly contaminated clothing, return from the laundry containing more TNT than when they entered. A recent case of TNT dermatitis developed in a man who worked in DNT, only. On checking his jumper just back from the laundry, the Webster test was strongly positive for TNT.

We have found that washing with 3 to 5% sodium sulphite preceding the regular wash, is necessary to remove TNT from clothing which is greatly contaminated. A routine check of washed clothing of TNT workers with Webster's reagent before it leaves the laundry is essential.

Dispensing Soap

WE SUPPLY the special liquid soap for all washing purposes throughout the TNT and tetryl areas. Two five-gallon containers supply soap by gravity flow to free-flowing valve dispensers located at each of the nine showers in the individual change houses. The usual dispensers supply the special liquid soap for washing the hands and face.

Education of Workers

IN CHANGING from the bar soap to liquid soap—which is less convenient for the shower—it was necessary to demonstrate to the men the need for the change. Workers were shown at their health meetings that the bar soap would not remove all TNT, even though washing was done more thoroughly than usual. The Webster reagent was used to show them that the recommended soap would completely remove TNT from the most contaminated skin, except under the finger nails. Demonstrations proved to them that the brushes would clean the TNT from under the nails. Dispensers containing the Webster reagent are conveniently placed at all showers and wash fountains so that the men may check themselves for presence of TNT following the shower or after washing hands and face. Where exposure is great, men are encouraged to wash exposed parts at hourly intervals.

Summary

UNDER the present conditions of handling TNT in munitions works, it tends to accumulate on the skin of exposed workers, because it cannot be removed by washing with ordinary toilet soaps and water. TNT left on the skin is absorbed throughout the 24-hour period and adversely affects the health of workers.

Profiting by the previous work of others, and aided by soap manufacturers, we have developed an effective remover for TNT. It is composed of liquid soap to which is added 5 to 10% of potassium sulphate and 5 to 15% of an appropriate wetting agent. I believe that the use of such a soap will materially reduce the incidence of toxic effects among exposed TNT workers. Information relative to companies from whom the special liquid soap may be secured may be obtained from the office of Colonel W. J. McConnell, Medical Corps, Office of the Chief of Ordnance, 333 North Michigan Avenue, Chicago.

The soap has also proved effective in removing tetryl from the skin.

A much more general use of Webster skin reagent is recommended.

It is hoped that this article will stimulate others to work actively on this problem, as its effective solution is most important in maintaining the good health of our munition workers.

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Prevention of Skin Rashes

—The Practical Solution of the "Cutting-Oil" Problem—

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OVER four months ago, while looking over some figures I had had broken down on an entirely different subject, I ran across a seeming miracle. You read about them in the Bible, but as industrial medicine is not mentioned there, except perhaps in the Book of Job, such an event was a surprise. This breakdown showed that in one of our plants there was not a lost time rash in three months. There were two rashes requiring transfer, both from the hardening room, and both individuals were patch test sensitive to cyanide.

This plant is using identically the same oils, cooling solutions, processes, and solvents as our other two. Immediately an investigation was started to find out why this plants' record was so outstanding. The answer was simply "good housekeeping." Each month every machine was cleaned and the oil changed. We also found our second plant was giving only a small percentage of lost time rashes, per numbers employed, under the same working conditions. The housekeeping in this plant was not as good as in the first, but could be classed as fair.

Conditions in our main plant were poor. We had known this for a long time. Cooperation, except in a few departments, was lacking. The fixed ideas of older foremen and the general attitude of "it always has been done this way" takes a long time to overcome. However, the incidence of rashes in the main plant was below what Dr. Schwartz calls the irreducible minimum of 1% per year in disabling rashes.

This had been achieved by promoting personal hygiene, the use of various suitable skin protectants, the use of neoprene gloves, and plastic sleeves when indicated, and the insistence that any new process oil or solvent must be reported to our department before its use.

Also, in our monthly page for both the company and union papers, we have many times emphasized care of the skin and have given specific directions to accomplish this purpose.

Another factor in our results had been the fitting of skins to the job in our pre-placement examinations.

In 2N an assistant foreman developed a bad dermatophytid of the hands (we know a number of other foremen who we hope will be so affected). The housekeeping in this department was very poor and so was its incidence of rashes. Through this assistant foreman we were able materially to improve their unfavorable conditions and reduce their percentage of rashes.

We charted our entire plant and found that in the number of lost time cases and in the incidence of lost time rashes per population, the following departments, namely, 2E5, 2N, ST 10, 3S, ST 6 and ST 8, gave us nearly all our cases. Also, in these departments housekeeping was at its worst. By reducing our figures to the dollar and cost-production basis, using this as a lever, and applying pressure in the right places, conditions were improved. The results of our combined efforts are shown on the following chart made out from our monthly reports:

	Rashes	
	Frequency Rate (Per Million Hrs.)	Severity Rate (Per Million Hrs)
August	5.76	1.90
September	3.86	1.84
October	3.62	1.77
November	2.79	0.99
December	2.36	0.79
January	1.41	0.87

You can draw your own conclusions as to housekeeping.

WE HAVE long known that it is the activated dermatophytid that has been responsible for at least 40% of our lost time rashes and a larger proportion of the longer disabilities. At the present time there is a lack of a positive method in diagnosing the dermatophytid, especially when combined with a contact factor. When such a test is developed the percentage may rise toward 50%. This condition apparently has been reduced to an unbelievable low in the departments with a housecleaning program. Contact, alkaline rashes, and perhaps true oil sensitivities, are also apparently lessened.

We find that eczematoid rashes about amputation stumps, and wounds on the fingers and lower legs are only in a small percentage of cases due to oil, sulfa drugs or adhesive tape. Culture proves this condition due to primary fungus in a surprisingly large number of instances.

It has long been my contention that the precipitating factor of the latent dermatophytid occurs in nearly every case in an insoluble oil that has been run in a machine for at least a month. It is practically never seen among our workers in either the soluble oil or lard oil. Once this dermatophytid has been established the individual will be patch test sensitive in many instances, not only to cutting oil but also to the soluble oil, and to adhesive tape, wrong medication, etc. Whether or not these individuals are patch test sensitive after they are ready to return to work, they will blow up if placed on machines using either cutting oil or soluble oil, and suitable dry jobs must be found for them indefinitely.

We have speculated on what this factor may be. Is it some change in the oil itself, due to heat or to absorption of some component parts of the steel? Is it due to a chemical change in the sulphur? Or is it an organic contamination?

DR. SCHWARTZ, DR. PHARRIS, and many others agree that pyogenic bacteria do not grow in a good grade of heavy cutting oil. This we have proved in our own case by many laboratory cultures, so this is not a factor. Why is it that little run oils do not elicit this latent dermatophytid and yet after elicitation by old oils the individuals cannot work in any oil or soluble oil again?

About three months ago we interested DR. CRIT PHARRIS, of the Industrial Division of the Connecticut State Health Department, in our surmises. After six week's work their chemists were unable to carry the task further, because priorities could not be obtained for necessary equipment. The table below is a chart of their findings.

Apparently all this proves is that we have a good grade cutting oil and that the pH and total sulphur content are not markedly changed in the machine and that they are within favorable limits, so far as skin is concerned. We had oil that had been run a long time in a machine analyzed for chromium by the Henry Souther Laboratory, but they reported no trace of this metal. There was some iron in this oil. Is it an iron sulphhr compound that activates the latent phytid?

Some industrial physicians report good results from the addition of various germicidal compounds to their oils. Are these results due to precipitating or neutralizing this suspected unknown factor, rather than to any germicidal action on a heavy cutting oil which contains practically no bacteria?

At our request (through the Industrial Division of our State Health Department) to DR. LOUIS SCHWARTZ, Medical Director and Chief, Dermatoses Investigations Section, National Institute of Health, Bethseda, Mary-

Sample				pH		
No.	Dept.	Type of Sample	Chlorine	Water	Benzol—Alcohol	Sulphur
1	2E5	Hot alkali cleaner	—	9.25	—	—
2	2E5	Soluble oil, milling machine No. 3749	—	8.2	—	—
3	2E5	Soluble oil, milling machine No. 6722	—	7.6	—	—
4	3N9	Soluble oil, milling machine No. 665	—	9.25	—	—
5	4N9	Kerosene (hand cleaning)	nil	5.8	7.2	15%
6	3N9	Lard oil N. press No. 728	nil	2.8	7	0.005%
7	4N9	Insoluble oil, hand milling machine (battery 2)	nil	6	6.6	1.10%
8	ST 6	Insoluble oil, turret lathe No. 411	nil	5.5	6.6	1.30%
9	4N9	Insoluble oil, drill No. 519	nil	6.6	6.5	1.31%
10	ST 6	Insoluble oil, turret lathe No. 9528	nil	6.3	6.2	0.96%
11	2E5	Insoluble oil, milling machine No. 4244	nil	9.3	7.2	1.16%
12	2E5	Insoluble oil, profiling machine No. 876	nil	6	6.5	1.35
13	ST 8	Insoluble oil, milling machine No. 119	nil	4.9	5	1.25
14	1N 10	Insoluble oil, turret lathe machine No. 1390	nil	4	6.2	1.11%
15	1E8	Insoluble oil, milling machine No. 8019	nil	6.1	5.5	1.60%
16	2E5	Lard oil, vertical drill unit No. 4046	nil	3.2	5.7	0.005%
17	1N 10	Insoluble oil, turret lathe No. 1318	nil	6.5	6.2	1.30%
18	2E5	Insoluble oil, hand drilling machine No. 698	nil	4	6.4	.97%
19	1E8	Insoluble oil, new stock oil	nil	4	6.3	.45%
20	1N 10	Insoluble oil, M mill machine No. 670	nil	5.8	5.5	.55%
21	3N9	Insoluble oil, M mill machine No. 697	nil	6.5	6.5	.51%
22	Hold—Do not exam. at present.					
23	1E8	Soluble oil	—	7.2	—	—
24	1E8	Soluble oil (Mach. U.S. No. 50c.31)	—	9.1	—	—
25	2E5	Soluble oil (new stock (die) oil)	—	7.5	—	—

land, DR. SAMUEL M. PECK, now Major, Acting Chief, Dermatoses Investigations Section, and DR. I. BOTVINICK were assigned to us for a week. We have had the most interesting, instructive, and pleasurable week in our experience.

After this investigation we are permitted to say that we have "interested DR. PECK in the question of the elicitation of a latent 'id' by old oils."

From our clinical finding alone we feel that a plant operating machine tools, provided it uses a good grade cutting oil, can reduce its serious rashes considerably below the supposed irreducible 1% per year. We feel that changing the oil and cleaning the machines once a month is part of the answer. We also strongly feel that laboratory and scientific proof of our clinical finding and observations is on the way. We more than suspect that a way has been found positively to diagnose the dermatophytid, and we have more than hope that a way will be found to enable these unfortunates to return to work on their regular jobs. It is so simple and yet so hard to obtain good housekeeping in a factory. It truly is a part of the rash solution in plants using good cutting oils.

Educational Techniques in Industrial Nutrition

CLIFFORD KUH, M.D., Chief,
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AN EDUCATION program to justify itself must be in response to a need. There is considerable evidence of need for improved industrial nutrition. A number of studies have revealed nutritional deficiencies among industrial workers. Other studies have indicated poor selection of foods, as well as skipped or slighted breakfasts for which the noon meal at the plant does not compensate. Poor plant facilities for providing meals are commonplace, and the half-hour lunch time is frequently inadequate. There is lack of between-meal supplementary feedings. Food shortages complicate the picture.

As a possible solution to these nutritional problems, a six-point program has been advocated:

1. A general educational program for the public on nutrition.
2. An educational program within the plant to advise workers what to eat and why.
3. Improved nutritional facilities within the plant including cafeterias, canteens, mobile food units, and a nutritionist in the larger plants.
4. Education of restaurant owners who serve workers and of concessionaires who sell lunch-boxes.
5. Education of the workers' wives on how to pack nourishing lunches.
6. Presentation of meal plans and demonstrations.

Educational techniques in each of these six fields will be considered:

Education of the General Public

BOTH newspapers and the radio are an effective way of reaching the public locally and both media have been unusually cooperative in accepting nutritional material. Courses on nutrition have been given by the American Red Cross, home economists, and representatives of state and local health departments and county and local nutrition committees. A number of these organizations have given refresher courses for nutritionists, doctors and dentists. Indeed, business executives have attended these advanced courses.

It must not be overlooked that efforts directed to the general public constitute an indirect approach to industry. It has been urged that nutrition committees include representatives of leading industrial plants, as well as the many organizations and groups interested directly or indirectly in nutrition, among which might be mentioned agricultural and university extension service, home demonstration and farm adviser agencies, visiting nurse associations, tuberculosis associations, social welfare agencies, service clubs, women's clubs, veterans' organizations, and the church. As the school nutrition program may also have an indirect value for industry, parent-teacher associations should not be overlooked. It has been said that if we teach a pupil what constitutes a good lunch box, the pupil will not fail to criticize his dad's. Talent supplied through the local department of education has furnished many educational posters. Girl Scouts, Boy Scouts, Y.M.C.A., and similar groups should also be considered, as well as the block plan of the Office of Civilian Defense. A number of commercial organizations and insurance companies have developed well-organized programs for influencing the general public, and they are ever ready to supply valuable information. Governmental sources of material for the housewife include the Bureau of Home Economics of the Department of Agriculture, the Children's Bureau of the Department of Labor, and the Nutrition Service of the Office of Defense Health and Welfare Services. Institutional organizations in the milk, fish, meat, poultry and egg industries have also prepared pamphlets for distribution.

Educational Program Within the Plant

IN THIS regard plant periodicals or house organs are the best means of reaching the worker and, in many instances, have done unusually fine work in trying to change food habits in favor of available dishes that are nutritious and well-balanced. Innumerable plant posters are obtainable from many sources, and information concerning recipes and menus is likewise procurable.

Occasionally the nutritional exhibit is used within the plant, and nowadays the exhibit is accompanied by demonstrations on home raising of food or livestock and home preservation of food.

A relatively new educational approach to workers is through the labor-management production drive committees which now exist in nearly 2,000 plants throughout the country. It is suggested that these committees expand the activities of their safety subcommittees to include considerations of health and nutrition. The plant doctor or nurse should be on the subcommittee.

Improved Facilities Within the Plant

TO DEVELOP plant facilities one must usually reach management, although in some instances the plant cafeteria is managed by a committee of workers. Trade periodicals for management have not overlooked the subject of nutrition in both the advertising and text. The National Association of Manufacturers has recently published a booklet on the lunch-box, and state manufacturers' associations and state and local chambers of commerce are becoming more interested in nutritional programs. The United States Chamber of Commerce has recently announced the organization of an Advisory Health Council, the chairman of which is Dr. James S. McLester, former president of the American Medical Association, an outstanding authority on nutrition.

Also on the national level is the Industrial Nutrition Division of the Nutrition Service of the Office of Defense Health and Welfare Services, which utilizes the able technical advice of Dr. Robert S. Goodhart,

Presented before the Subcommittee on Food and Nutrition of the California State Council of Defense, San Francisco, February 4, 1943.

assisted by Dr. Elmer Alpert. Under their direction, personal visits have been made to plants in various communities, and each plant has been considered as presenting an individual problem with an individual solution. In one case a recommendation might be for a full-time or part-time nutritionist, while in another case supplementary feedings might be the requirement. The Industrial Nutrition Service of the Office of Defense Health and Welfare Services also supplies menus and news about food.

A Bay Area Nutrition in Industry Committee has been organized by Dr. W. Palmer Lucas, chairman of the San Francisco County Nutrition Council. The Committee is employing a full-time nutritionist and staff to improve nutritional facilities in San Francisco Bay Area shipyards and plants. The expense is being borne by funds from the sale of Christmas seals contributed by county tuberculosis associations in the Bay Area. The San Diego County Nutrition Committee is offering a consultation service to industry, and has recently sent a form letter to plants inquiring if the plant has a place for a volunteer, trained home economist who would give her services once a week to serve as a consultant an nutritional problems. The letter also asked concerning specific needs in respect to budgets for family dietaries, individual diet instruction, and suggestions for cafeteria or canteen menus. In some localities the American Red Cross has offered industry a canteen service which supplies hot lunches to men at cost.

Utility companies and appliance manufacturers have not neglected this field.

Likewise, industrial doctors, nurses, and dentists are being reached through their professional journals and societies. A number of county medical societies are now organizing industrial health committees or subcommittees on industrial nutrition.

In response to the request of executives for actual data on the relation between diet and production, the Bureau of Industrial Health of the California Department of Public Health has prepared an article for distribution, entitled, "Diet and the Production of War Materiel," the data being based largely on the work of Haggard and Greenberg, who have studied the relationship of supplementary feedings to efficiency and absenteeism.

Education of Owners and Concessionaires

SOME nutrition committees aim to include representatives of these food distributing organizations on their committee, but the matter of influencing food distributors is not simple. They must be shown how to make a profit while selling good food. Considerations involving food production, processing, and marketing all enter into the problem. In some instances, committee members have personally called on restaurant owners, concessionaires, or their associations, and have urged the offering of higher quality box lunches. Posters supplied to restaurant owners aiming to carry the message of good nutrition to their customers have an indirect effect on the restaurateur. It is important also not to neglect boarding house keepers in war areas.

Education of Housewives

THE housewife is, of course, reached through efforts directed toward the general public, and plant magazine material reaches the housewife as well as the worker. The national women's magazines are publishing much material on nutrition. Locally lunch box derbies have been extremely effective in spreading the good word on nutritious and varied luncheon menus, and have elicited much well-earned newspaper publicity.

Neighborhood Meal Demonstrations

THE appliance manufacturers and utility companies have been active in staging neighborhood meal demonstrations, as have the American Red Cross and other groups. Of particular interest might be mentioned an experimental demonstration, now being conducted in a Los Angeles plant, where an excellent plate or box luncheon is being served, a supplementary feeding is given in the middle of the second half of the shift, and a neighborhood demonstration is staged for the housewife. The supplementary feeding includes a beverage and food, both of which are enriched with vitamins. The possibly favorable effect of this program on absenteeism and production is awaited with interest.

This brief review of possible techniques which may be used to improve plant nutrition is by no means complete, but it is offered in the hope it might be of value to those interested in the subject.

Intracapsular Fractures

—A New Method of Nailing the Neck of the Femur—

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IN NAILING intracapsular fractures, I believe that any bone surgeon encounters difficulty in driving the pins or nails so that they penetrate the canal of the neck of the femur and the flange of the nail rests directly on the inferior aspect of the femoral neck. When this is done, the weight of the entire body is carried where the head of the femur touches the acetabulum, having the weight of the ilium on this point, the second point being on the inferior border of the neck, and the third point being two inches inferior to the lowest border of the greater trochanter. This may be best seen by looking at Fig. "A." The technique of driving this nail in exactly the position I describe is extremely simple if the following is observed. It must be understood that in this technique the nail is driven in act a much greater angle in respect to the femur than in the original technique described by Dr. Smith-Petersen.

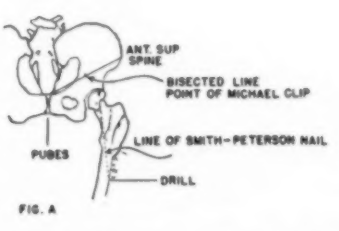

FIG. A

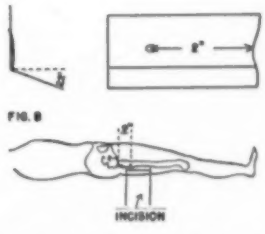

FIG. B

The patient is placed on the Hawley table so that he is in the true anatomical position, the toes being pointed directly up, with moderate extension of both legs, and both legs in slight abduction. A tunneled cassette is placed under him so that an x-ray plate can be inserted or removed without moving the patient. These fractures are easily reduced with the procedure described, and it is of utmost importance that, from an anterior posterior view as well as the lateral view, these fractures be properly reduced. I believe where most errors are made is that in the lateral view the head of the femur is not shown to be anterior to the shaft, which is the true anatomical position.

The anterior spine of the pelvis is marked and the pubic spine on the same side is marked. At exactly half-way between these two points, one may be able to palpate the femoral artery. A drop of novocain is injected in the skin and a Michael clip is snapped on

to the skin surface. X-ray examination will show this clip to be exactly over the center of the acetabulum. Under local anesthesia an incision is made starting at the inferior border of the greater trochanter and extending down about three inches. This incision is made over the true lateral aspect of the femur. If this incision is done correctly, no muscle has to be severed, only the muscle sheath may easily be retracted and two and a half or three inches of the femur exposed. Two inches inferior to the lowest border of the trochanter a five thirty-seconds inch drill is started, this drill being inserted a little posterior to the middle line of the femur. After the drill is started it is pointed directly to the Michael clip on the skin, the drill simultaneously being driven in at 22° it is easy to insert the guide which I show in Fig. "B." This guide is attached directly to coincide with the inferior border of the greater trochanter and is held in place by two small bone pins. The oval opening in the guide is two inches below the trochanter, the hole being large enough to be able to manipulate the drill within a radius of 5° to either side.

After it has gone through cortical substances of the one side of the bone the drill is removed and a three thirty-seconds Kirschner wire is inserted in the hole. This wire will then easily follow the canal of the femur and should not meet any resistance until the head of the femur is encountered. Then, with a chuck the wire is drilled into the head of the bone to about one-half inch. This wire is now in identically the position the nail will occupy when driven. A bone facer is then strung over the wire and the outer cortex of the bone completely faced so that when the nail is driven it will countersink into the cortex. The facer is now removed and the Smith-Petersen nail strung over the wire which now lies in the canal. It is very important that one of the "Y's" is posterior so that it will lie directly over the inferior angle of the neck of the femur. A five-inch Smith-Petersen nail is now driven into the ship.

It should be noted that a nail is used any length from one-half inch to one inch longer than the original nails described by Smith-Petersen or Johhanson, the reason being that the angle of this technique is much greater and also that no impaction of the fragments is necessary because these fragments compensate for themselves without any impaction.

In conclusion the benefits of this method are: first, simplified technique; second, positive nailing of the fragments within one-fourth to one-half inch of and through anatomical relationship; third, self-impaction.

Industrial Nursing Service

—A Suggested Yardstick for Judging its Efficiency—

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THROUGH time-studies, industrial engineers have broken down production jobs in industry until it is possible to determine with reasonable exactitude the efficiency of most workers at any given time.

Because the authors are unacquainted with any critical studies covering the effectiveness with which industrial nursing programs are accomplished, the following ideas are submitted as an effort toward establishing criteria for judging such service.

This inquiry seems particularly pertinent at this time because the war has brought acute shortages of physicians and nurses in many communities. Industry must stretch what it has left to cover it as effectively as possible, at least for the duration. The effective utilization of the service of nurses seems one of the most desirable steps in this direction.

Although it would not be expected that one nurse could maintain the routine of all the jobs subsequently listed in one day, even in a plant with 200 employees, the scope of the nursing, welfare, administrative and clerical procedures that frequently are assumed by nursing services in industries today is indicated.

The important consideration is that duties be envisioned by management and arrangements made *in advance* for their accomplishment. Whether it expedites the job occasionally to delegate certain phases of it to the Personnel or Safety Departments or to clerks or technicians would be a matter to be decided individually by local management.

To simplify rating, the full program has been broken down into 10 divisions. The value noted at the right hand margin is an estimate of the percentage of the nurse's time that usually must be allocated for maintaining the particular group of duties. This time breakdown is based primarily on the problems in a small plant where one nurse would be responsible for the entire service.

ALLOCATION OF NURSE'S TIME in INDUSTRIAL HEALTH AND WELFARE SERVICES

I. Accident Cases 10%
1. First aid for *all* injuries.
2. Management of minor occupational injuries, as outlined in *written* "Standing Orders."
3. Assisting physician with major injuries.
4. Arrange ambulance service for problems needing emergency hospitalization.
5. Maintenance of spotlessly clean dispensary with adequate supplies on hand for all emergencies.
6. Reports covering all injuries for nursing files and insurance carrier.
7. Monthly summary of above with breakdown by department when indicated.

II. Occupational Disease Control 7%
A program for assuring the automatic inspection and follow-up on any and all forms of dermatitis and occupational disease inherent in the manufacturing techniques within the plant.

III. Assistance in Examinations 15%
Pre-placement:
1. Occupational and past personal history.
2. Identification.
3. Height, weight, vision, hearing, dental inspections and blood pressure.
4. Collection of material for laboratory analyses.
5. Be present during physician's examination of all females.
6. Maintenance of records on above with monthly summary of volume of this work.

Periodic:
Same services as pre-placement:
(a) For factory employees.
(b) For management group.

Special:
Same services as pre-placement (for exposures to benzol, lead, silica, etc.).

IV. Health Consultations 15%
1. Private discussions with employees who have high absentee rates, sudden slumps in production, or other evidences of disease or maladjustment problems to see whether the nurse, through the facilities of the company, might not be able to remedy or ameliorate the basic problems.
2. Treatment of colds, headaches, intestinal disturbance and other routine minor health problems as outlined in written "Standing Orders."
3. Automatic follow-up on employees with correctible physical defects.
4. Special supervision of pregnant employees

under company's rules as outlined in "Standing Orders."

V. Communicable Disease Control 4%
Immunization:
1. Pre-placement: smallpox, typhoid, tetanus, or other.
2. Periodic: annually, as outlined in written "Standing Orders," or with threats of local epidemics.

Venereal Disease Control:
In addition to collection of samples and such diagnostic laboratory work as is indicated under that heading, the nurse should be responsible for:
1. Keeping a *confidential* file on all positive cases of venereal infection.
2. Having each infected employee submit weekly a doctor's statement that he has appeared regularly and taken adequate treatment.

VI. Laboratory 2%
1. Urinalyses.
2. Blood counts, differentials, etc.
3. Serological work.
4. Taking of x-rays.
5. Maintenance of records of above.

VII. Absenteeism Recording 5%
Employees returning to work after absence:
1. Reason for absence and amount of time lost.
2. Check employees to assure company that they are free from communicable disease and sufficiently recovered for safe return to work.
3. Monthly and annual summary and breakdown of material collected from above.

Maintenance of Tickler File to assure automatic follow-up on all jobs.

VIII. Nutritional and Dietetic Service 2%
1. Consultation with manager of lunch room and/or supervision and extension of eating facilities provided by company.
2. Personal and group consultations with employees on nutrition.

IX. Health and Safety Promotion and Control.... 20%
1. Teach first aid classes.
2. Talks before union meetings and other employee groups on general health problems and the scope of the medical services of the company.
3. Periodic, unannounced drills covering procedures to be followed during fire, explosion or other major disaster.
4. Assisting with accident investigation.
5. Assist in supervision of matrons or porters assigned to plant maintenance.
6. Assist in development of recreational programs.
7. Supply and maintenance of personal protective equipment.

Daily plant inspections tour (preferably with Safety Director) to see that:
8. All safety appliances are operating properly.
9. Safety routines and habits of employees are watched and improved.
10. All areas of potential hazards are adequately supervised.
11. Lighting is adequate.
12. Room temperature controls are effective.
13. Room ventilation is adequate.
14. Stairways, rest rooms, wash rooms, toilets, lockers are kept clean and neat.
15. Drinking fountains and water supply are maintained in clean and safe condition.

X. Visiting Nurse Service 20%
1. Investigation of sick absenteeism.
2. Health education and advice for employees' families.
3. Follow-up of hospitalized and other accident cases.
4. Maintain contacts with County Health Department, Visiting and Public Health Nursing Associations and all relief agencies.
5. Contacts with community physicians about employee problems.
6. Field contacts for mutual-aid, sick-relief, or other group insurance programs.
7. Attendance at Workmen's Compensation hearings and other suits or conferences of a medicolegal nature.
8. Arrange for flowers, the loan of a radio, or other company considerations extended to injured and hospitalized employees.
9. Arrange for convalescent care of rehabilitation.
10. Aid, transportation, and advice to families in accident emergency—this, when necessary, to include complete arrangements for funeral and interment.

From the foregoing list of functions, it should be apparent that progressive industrial management carries on a rather extensive number of routine health and welfare functions.

All of these problems, though, must be anticipated and arrangements made for as fool-proof and automatic a follow-up service as possible.

Expected Volume of Work

AFTER considering the scope of the program and the relative amount of the nurse's time to be allocated to the various jobs, the next thought would reasonably be directed to the volume of work to be expected of the nurse.

By analyzing the data collected from industrial organizations in various parts of the country, it would seem that a nurse on eight-hour duty in a dispensary should be able to manage and record from 50 to 115 problems a day. These figures are averages for nurses whose full time is spent in the dispensary; the higher number of visits per day per nurse are found in the larger industrial medical units where nursing service is more specialized. (A case load as high as 600 for one nurse in one day was boasted by one company during a successful immunization program.)

Seemingly, all nurses who see an average case load of 75 a day or more are limited to the routine changing of dressings on minor injuries and the dispensing of medication. On the other hand, it is interesting to note that all medical departments contacted thought a nurse should be expected to see *at least* 50 cases if she stayed in the dispensary all day.

Using 50 cases a day as a base line, it seems fair to say that, unless the nurse sees this many on the average day, valuable time and skill are being wasted. Nevertheless, we know that in many very small plants the volume of the case load in the dispensary does not reach this figure even by covering all the procedures outlined under I through VII. This condition should be utilized by having the nurse in the dispensary at definite stated hours. While she is out in the plant or on home calls, her itinerary can be left with the telephone operator or some other suitable person. The amount of time that the nurse must necessarily be on duty in the dispensary can be calculated by allowing for an hour in the dispensary for every six to 10 patients to be seen.

These figures can be obtained from the average of the daily case load during the previous year. The remainder of her time could then be broken down into the duties covered in classifications VIII, IX and X.

Almost all of the duties outlined under these headings will keep the nurse outside the health department or dispensary. Any nurse who has had the full responsibility for these services in a small plant knows that much of her time is spent in administering them.

It is extremely difficult to make approximations of the amount of time required to administer these duties. In the larger plants, of course, much of this load is carried by dieticians and the safety department. In plants with less than 200 employees, the nurse and

the works manager generally administer these duties jointly—the nurse being responsible for most details and follow-up on the policies established by management. Varying with toxic exposures and the stress placed on this phase of the job in any given plant one may be safe in saying that approximately 20% to 30% of the time necessary to accomplish the duties outlined in sections I through VII will be required to accomplish those in sections VIII and IX.

Section X on Visiting Nurse Service brings up another problem. This service in industry is usually widely different from the services under that name offered by the various welfare and social agencies in the community. Many of the home contacts by industrial nurses represent frank efforts on the part of the company to assess their absentee problem.

Absentee follow-ups seem to be a thoroughly justifiable procedure when individual cases are not selected out of the group for disciplinary action. This latter course will of necessity discredit the whole visiting program in the eyes of the workers and preclude the chances of their accepting the manifold advantages that are inherent in such a service.

In this phase of the program, tact and helpfulness are imperative and a push for production quotas seems ill-advised. Some plants expect their visiting nurses to make as many as 30 home contacts a day. However, on a service limited to a six or eight mile radius from the plant, the most appreciated and effective jobs seem to be done on the basis of an average of 12 to 15 calls a day.

As industrial nursing service grows in scope and effectiveness in any given company there will be an increasing use made of these facilities by the employees. The growth will be limited by the tact, judgment and perserverance of the individual nurse. Most nurses are unfamiliar with the scope of modern industrial nursing programs. This is completely understandable since, at the present time, there are almost no courses or training opportunities available in this specialty for student nurses, a very few for graduates. The small plant must usually turn for help and advice on these problems to interested physicians, other industries in the vicinity, or the facilities of their State Division of Industrial Hygiene.

No consideration of this program would be complete without some statement of a point that is sometimes overlooked in planning, only to lead to some later friction. Almost without exception, industrial health facilities that are doing the progressive jobs in this field today are set up as autonomous units. They have a clear delineation of privileges and responsibilities between themselves and the safety and personnel departments.

As can easily be seen a company's health department that is dominated by either personnel or safety interests might reasonably expect an abnormal development of their own services.

Conclusion

A LIST of duties normally assumed by nurses in small plants has been given.

2. A statement has been made of the relative amounts of time usually allocated to the accomplishment of these various jobs.

3. A statement has been made of the volume of work normally expected of nurses in their various functions.

[The authors wish to express their appreciation particularly to DR. JOHN W. GALLIVAN, Medical Director, United Aircraft Corporation; DR. B. L. VOSBURGH, Medical Director, General Electric Company; and DR. W. C. TEMPLER, Medical Director, Corning Glass Works, for their particular cooperation in supplying us with exact data from their own experience.]

Medical Control of Industrial Exposure to Toxic Chemicals

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THE major function of the physician in industry is prevention, not diagnosis. Where there is a hazard to health from chemicals (and in these days this may be present in almost all industries), the physician must prevent not only spectacular cases of poisoning, but also less obvious conditions of depreciated health. Contrary to impressions often given by the literature of industrial toxicology, the major loss of time and efficiency (and, therefore, economic loss to both worker and employer) does not result from definite poisoning. It comes from many cases of a degree of impairment of health which may be unrecognized as to type or origin. Often these are classed by the family physician as "neuro-circulatory asthenia," "nervous indigestion," and so on. The most valuable work of the industrial physician lies in this borderline field. Thus, his total preventive function can best be expressed as "Maintenance of Good Health Under All Circumstances."

Preventive Industrial Medicine

PREVENTION is harder than diagnosis. It cannot be based successfully upon the type of information and laboratory tests used in diagnosis. It must be founded on a fund of practical physiological knowledge, which allows the early detection of even slight departure from the usual. Since the changes which must be noted are far less tangible than those present in frank poisoning, a program of preventive medicine must be even more systematic than one of diagnosis. It must include not only the examination of each employee on application for a job but also periodic study when at the job.

The Pre-employment Examination

WHEN he applies for employment, each worker should be given a comprehensive medical examination. The sole purpose of this examination is *selective*. By it, workers can be classified according to their physical ability to fulfill the duties of the jobs to which they are to be assigned and withstand the health hazards that may be involved.

The selective examination must be based on a detailed knowledge of the work done in each part of the plant. Where hazards from chemicals may exist, the examining physician must know all that he possibly can about them, and should classify them in some manner so that he may properly locate his workers. A physician who only examines, and does not make himself intimately acquainted with operations in his plant, is not an industrial physician. He is merely an examiner.

Because, in the practice of industrial preventive medicine, the medical study of the worker extends beyond the initial selective examination, that examination must contain all the procedures to be used later in periodic checks.

Periodic Examination

THE practice of selecting employees by a pre-employment examination and then studying them only when they are sick or are discharged is futile. Even the program of annual check-up examinations, while a great advance over a mere pre-employment examination, is woefully inadequate for the proper control of health in industries using chemicals. There must be a program of periodic re-examinations varying in frequency according to the degree of health hazard in different occupations.

Fundamental Information Required

SINCE the purpose of both selective and periodic examinations is to prevent the worker from being injured by his work, both must be based on proper information

This is the full text of DR. FOULGER'S presentation on this subject. Abbreviated, abstracted and summarized forms have been given from time to time, notably in *J.A.M.A.* September 6, 1941; *Med. Clin. N.A.*, July, 1942; *Pennsylvania Med. J.*, February, 1943; and *Delaware State Med. J.*, February and March, 1943. The last-mentioned publication was complete except for certain tabular and chart revisions which are given here.

about the hazards of that work. In the term, "proper information," lies the key to successful preventive medicine in industry. The literature on industrial toxicology is voluminous, but suffers from important defects. It deals almost exclusively with the clinical history and pathology of pronounced cases of human poisoning or of experimental poisoning of small laboratory animals. It necessarily covers only a limited number of industrial chemicals and tends to emphasize specificities in their action. Thus it fails to give information of use in hazards due to new chemicals.

The physician in industries using chemicals must remember that any chemical can be a source of injury if used carelessly or without proper information, but that with proper information and proper care, any chemical can be manufactured and used with minimal injury to health, no matter how potentially harmful it may be.

It is usual to divide cases of chemical injury into two major classes—acute and chronic. Acute poisoning appears within a few minutes, hours, or days of exposure to a very active concentration of a toxic chemical. Chronic poisoning develops slowly during months or years of exposure to low concentrations of a toxic chemical or at least to concentrations which are not immediately highly effective.

Existing literature on industrial toxicology overemphasizes acute poisoning. This leads some to believe that unless a chemical quickly causes obvious injury or death, it is not to be feared. No conclusion could be more erroneous. The loss of time and efficiency in industry, from cases of acute poisoning is relatively insignificant if compared with losses due to undetected or unrecognized effects of prolonged exposure to such concentrations of chemicals as never cause acute poisoning.

Acute poisoning usually results from accident or carelessness. Accidents follow a breakdown of physical equipment, temporary inadequacy of personnel, or carelessness. The breakdown of physical equipment may be the result of initial faulty construction, poor maintenance, improper operation, or, again, carelessness. Construction, maintenance and operation problems lie in the field of the engineer and chemical engineer. The physician, as physician, has here no function other than diagnosis and treatment of the results of accidents.

By temporary inadequacy of personnel, we mean the failure of usually competent workers to perform their duties when this failure is definitely not due to ordinary carelessness. Accidents originating in such failures may be very serious, involving more than the defective worker, and quite frequently leading to important damage to material and equipment. We may suggest, as examples, some of the major accidents in war explosives industries. Little study has been made of this temporary inadequacy. There is reason to suggest that it may be due sometimes to the undetected effects of chronic exposure to chemicals.

Proper information for diagnosis and treatment of acute poisoning comprises that mass of clinical knowledge used in any case of sickness. Apart from occasional specific antidotes which may hinder or prevent absorption of poisons taken orally, the principles of diagnosis and treatment are the same as for any illness. It is not absolutely necessary to know the cause of injury to find which organs are affected. A knowledge of the specific action of some chemicals may help in selecting the best (that is, the safest and most rapid) means of eliminating them from the system, and allow the physician to foresee possible complications; but the poisoned patient can be treated successfully even if the cause of his condition is not known. This is fortunate because the literature of toxicology, voluminous as it is, covers only a few of the chemicals used in industry and could never keep pace with the rate with which new ones are produced. In these days of chemotherapy one warning is in order. When treating a case of chemical poisoning, be sure that your therapy does not further injure the patient. The reasons for this warning will be apparent later.

Chronic poisoning, by definition, does not develop rapidly and, therefore, cannot be ascribed to accident. It may result from an initial defective construction of physical equipment, or from defects due to the inevitable forces of aging, or to improper operation. Probably, however, most chronic poisonings may be ascribed to the practical impossibility of preventing all contact of worker with chemical. This is particularly the case when a toxic substance can be absorbed through the skin, a route of exposure which is much more common than is usually suspected.

Since, in chronic poisoning, months or years may be involved in slow development of injury before the victim is recognized clinically as sick, there may be no definite point at which the physician can be advised to apply his diagnostic skill. The major function of the physician here is prevention, not diagnosis, and, therefore, it is important that his proper information is such as to allow of detecting the least departure of the worker from his normal physical condition.

The literature of industrial toxicology is specifically defective in adequate information for a program for prevention of chronic poisoning. There has been a lack of opportunity for close, continuous observation of workers. The detection of slight departures from normal health and their trend cannot be made by the usual laboratory tests or procedures of pathology. Controlled experiments on small animals are of little value unless a detailed study of physiology on the intact animals is carried out.

Close medical observation of workers exposed to chemicals has been difficult because the methods used must conform to certain rigid criteria. Industry aims at making goods not medical records. Any examination of workers requires absence from the job. The type of examination used must, therefore, be simple, not involving much loss of time or the use of techniques such as blood sampling, which might reduce the efficiency of the worker, or lead to personal objections. To give the maximum information with least time loss, data must be obtained as measurements not opinions, and so recorded as to be susceptible to statistical analysis. In the interest of scientific economy, the procedure of examination should be applicable to at least the majority of chemical exposures now existing, and to at least a majority of those which might result from introduction of new substances into industry. The changes from normal which the examination measures and records must, therefore, not be specific, but rather those produced by a majority of chemicals in concentrations having a low degree of physiological activity.

No success has attended efforts to base a general picture of physiological action upon gross or minor details of chemical structure. The numerical values of many physical properties can be calculated arithmetically from indices for active chemical groups or nuclei. Therefore, such physical properties are also useless in formulating a general picture.

In view of the special requirements of medical examinations used in control of industrial exposure to toxic chemicals, and in the absence of a basis for a general theory derived from chemical structure or physical properties, it is best to discard all considerations of such structure and properties and to concentrate attention upon the first response of humans or experimental animals when foreign substances are absorbed by any route, and especially through the respiratory and alimentary tracts or the skin.

Early Effects of Absorption

NEARLY five years of study of animals and men exposed to a wide variety of toxic chemicals has enabled us to set up a relatively simple program for prevention of ill health. It is a program of medical control which is not time-consuming, and requires no complicated apparatus. It applies to large and small plants and, indeed, is adapted most easily to small plants. It can be used to study exposures to chemicals of known toxicity and to detect and follow the activity of new chemicals. The details of this scheme and results of the application are described below.

The earliest detectable action of toxic chemicals which, when absorbed into the body by any route, have a systemic, as opposed to a purely local effect, is not specific. It does not depend, except in intensity and rate of onset, upon the chemical structure or obvious physical properties of the compound involved. This early action is due to changes in the metabolism of individual tissue cells and can be described in crude terms as interference with the oxidation-reduction processes in those cells. Any agent which interferes with these same processes will lead to the same initial results. Thus, disease, malnutrition, unnecessary exertion, or exposure to extremes of climate, may act in the same way as absorption of toxic chemicals.

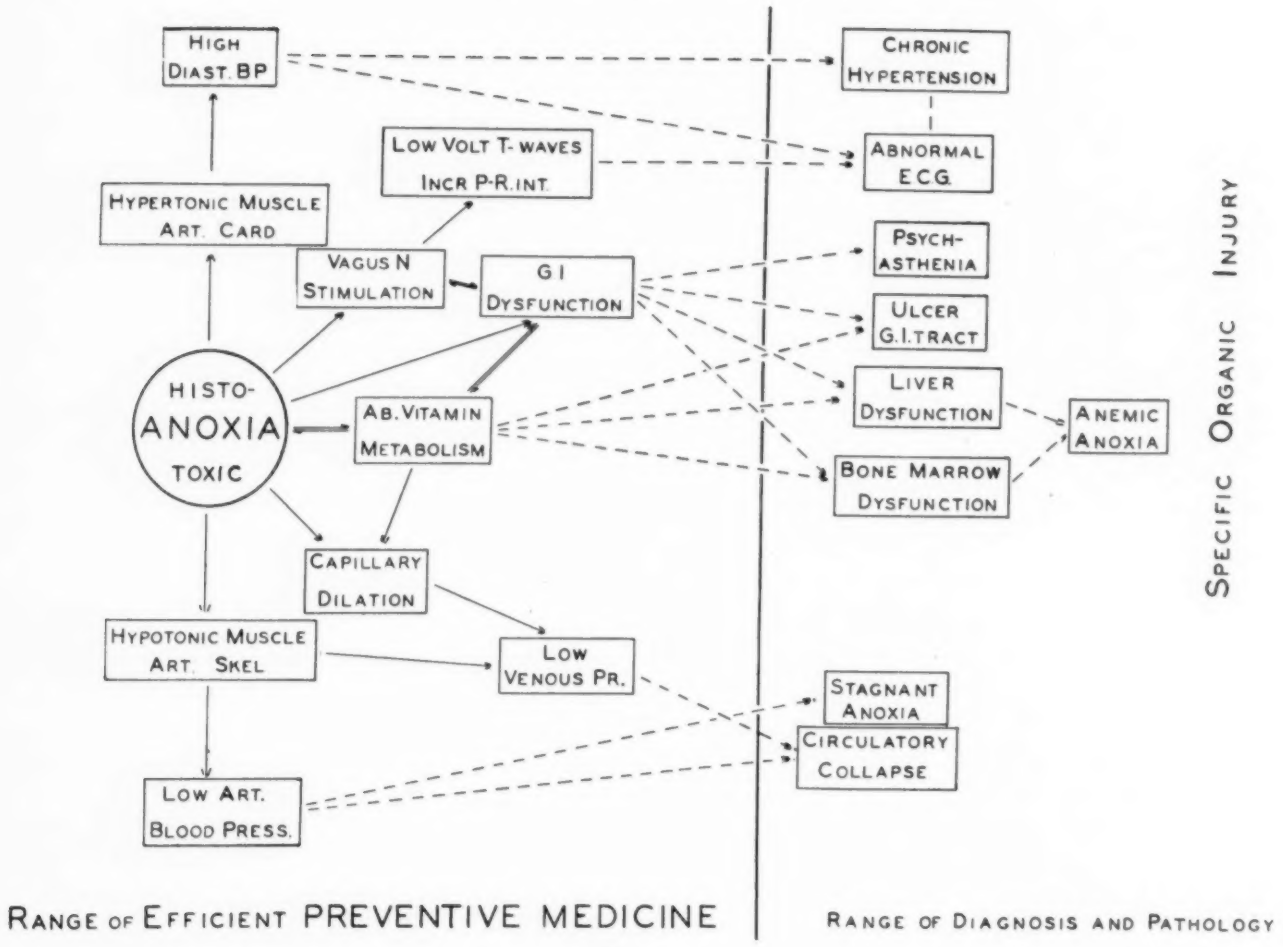


Fig. 1.
Diagram showing early stages of physiological action of toxic chemicals and relationship of these early stages to chemical poisoning

Fig. 1 shows diagrammatically the trend of events during exposure to chemicals. The two regions of the chart may not be clearly defined in cases of acute poisoning, but careful study of animals under controlled conditions, as well as many workers continuously exposed to a wide variety of substances, has shown the existence of each stage in the "Range of Efficient Preventive Medicine." Each of these changes is reversible. Its early detection affords an opportunity to stop progress toward the region of definite poisoning (range of diagnosis and pathology). An effective program of preventive medicine must, therefore, be based on the recognition and measurement of one or more of these early stages.

The early physiological action of foreign chemicals leads to a rather simple group of symptoms and signs. The symptoms include: unusual fatigue or lassitude; headache; dizziness; gastro-enteric disturbances (nausea, loss of appetite, fullness of the stomach, frequent eructations, uneasiness or pain in the epigastrium); palpitation.

All are not present at the same time. Some may never be noted in a given case. Unusual fatigue or lassitude and gastro-enteric disturbance are the most common.

Later in the history of exposure there may be increased intensity or frequency of these symptoms, or others may appear, such as pain in the precordium, tingling or pain in the extremities, pain in the neck, and dyspnea on slight exertion.

Symptoms are more or less matters of opinion. No two workers describe the same feeling in the same way. No two can give the examiner the same impression of the intensity of feeling. Further, many factors affect the degree of frankness of a worker in describing his symptoms. Symptoms should be entered on examination records, but since they cannot be expressed numerically, they are of minor value in a practical program of preventive medicine.

The signs of the early action of toxic chemicals are also limited and most require special equipment for detection. Fortunately one sign is easily measured. This is a change of blood pressure from the usual level. At first the change may be slight, but later it is so great as to give blood pressure readings which are far from the usual.

Much clinical information on blood pressure comes from the study of people who are obviously sick or from isolated examinations of applicants for life insurance policies. The results of such studies are misleading. They suggest a great variability of pressure which we have not found in frequent routine examinations of workers. Many records, obtained from hundreds of workers by examinations made as often as twice a month for five years, show that the blood pressure of a given individual remains within rather narrow limits so long as he is not affected by such factors as disease, malnutrition or toxic chemicals. The usual clinical studies of blood pressure show a general upward trend of values with age, and it is implied that chronological age alone is a determining factor. But the term, "age," holds the possibility of action of such important agents as disease, change in economic status with resultant psychic effects, change in nutrition, etc. Our accumulated data on blood pressure does not indicate that age, per se, plays a vitally important part in determining the pressure level. It is certainly subordinate to disease, malnutrition and exposure to chemicals.

Early exposure to low concentrations of chemicals just adequate to have physiological action tends to cause a rise in diastolic blood pressure. Special studies indicate that this is the result of a stimulation which increases the tonus of the muscle of the arterial walls and that property which corresponds to tonus in the heart muscle itself. With continued low grade exposure, the rise in diastolic blood pressure may go on until definitely abnormal levels are reached, and these may become fixed. With the rise of diastolic pressure there is not, at first, an appreciable change in systolic pressure. Therefore, pulse pressure gradually diminishes, and may reach abnormally low values.

When the diastolic blood pressure has risen and become fixed at abnormal levels, the systolic pressure often begins to rise and eventually both systolic and diastolic hypertension are attained and may persist. But abnormally high systolic pressure is definitely not one of the signs of early exposure to toxic chemicals.

Higher concentrations of the same chemical act as a depressant and lead to a fall in systolic and diastolic blood pressure. These two factors may not fall at the same rate so that pulse pressure may change. Eventually, both systolic and diastolic pressure attain abnormally low levels. Usually the systolic pressure is the first to become abnormal. One may often see cases in which all three blood pressure components—systolic, pulse and diastolic pressures—are very low. This depressant phase of the action of chemicals can lead to circulatory collapse, as a result of marked diminution in muscle tonus and a failure of the venous blood to return in adequate quantity to the right side of the heart, thus decreasing the ability of the circulatory system to compensate for changes in posture.

These changes in blood pressure, even the most drastic, appear before any tissue is irreversibly injured. They are purely functional in origin, but if the exposure which causes them is allowed to persist definite organic injury may follow—the typical textbook picture of poisoning.

Measurement of Blood Pressure

BLOOD pressure measurements can be used in a program of preventive medicine only if they are properly made and recorded, and are studied by a procedure which allows one to follow trends.

In our work we find it best to measure the blood pressure with the patient sitting, employing the technic recommended by the Joint Committee of the American Heart Association and the Cardiac Society of Great Britain and Ireland,[1] with certain additions mentioned below. Before any measurement is made, the patient must have been sitting quietly for at least five minutes, without smoking. This allows the circulatory system to become stable after the exertion necessary in going from the place of work to the plant physician's office.

We measure the pressure on both arms. In changing the sphygmomanometer cuff from one arm to the other, the worker should not get up, or move rapidly to assume a comfortable position. He should move slowly; otherwise, he destroys the stability produced by the five minutes of rest.

We measure and record routinely the diastolic pressure on both arms, at fourth and fifth phases (i.e., change of sound and disappearance of sound), and all pressure measurements are entered on the record at the actual level shown by the manometer (usually to each 2 mm.)—not at the nearest 5 to 10 mm. There is no gesture more useless, even for "the record," than a measurement of blood pressure recorded to the nearest 10 mm.

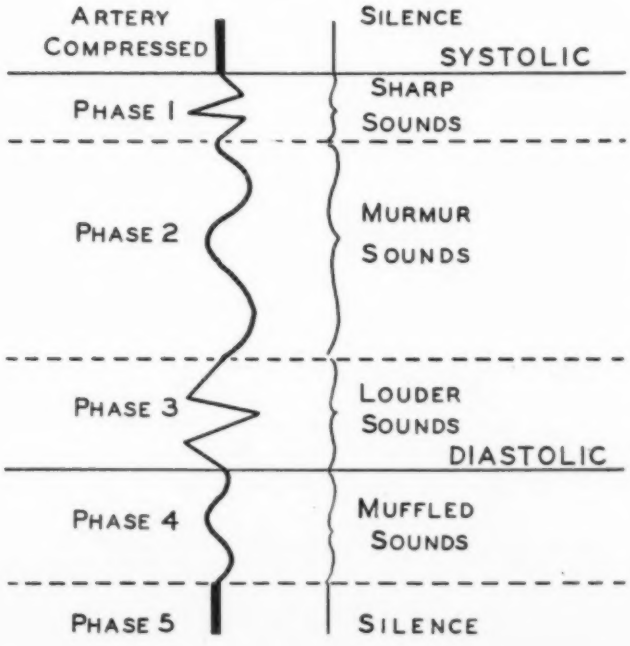


Diagram of sound phases in measurement of blood pressure, from Robert Southby, Med. Journal of Australia, 2: 569, 1935

The measurement on both arms and at both readings of diastolic pressure is not ordinary clinical practice, but in preventive medicine in industry we find it valuable, since experience shows that one of the earliest signs of physiological action of chemicals may be an abnormal difference between systolic or diastolic pressures of the two arms, or between the two levels of diastolic pressure on one or both arms.

Useful Levels of Blood Pressure

IN REPEATED surveys of medical records, we find that the occurrence of readings *outside* the following arbitrary "normal" limits in individuals selected by pre-employment examination give indications of chemical exposure or other factors mentioned later. These levels are also useful in quick estimates of the significance of the pre-employment examination, itself.

"Normal" Pressure Limits

SYSTOLIC Pressure	100 - 149 mm.
Diastolic	65 - 89 mm.
Pulse Pressure	30 - 58 mm.
Difference between two arms:	
Systolic Pressure	0 - 20 mm.
Diastolic Pressure	0 - 10 mm.
Difference between fourth and fifth phase diastolic pressure, either arm	0 - 10 mm.

Scores of Blood Pressure

THE use of such arbitrary levels, however, gives little information on trends and less on the actual condition of the circulation as a whole. For this reason we have developed a system which gives a score to each blood pressure reading according to the distance of pulse pressure and diastolic pressure from the respective means derived from a study of many records.

Mathematically, it is expressed by the formula:

$$\ln S = -0.00339\ (x^2 + y^2)$$

where

S = Score
ln S = Logarithm of S to the base 10.
x = Deviation of diastolic blood pressure from an established mean of 79 mm.
y = Deviation of the pulse pressure from an established mean of 44 mm.

The nomograph (Fig. 2) allows of easy reading of the score for any level of diastolic and pulse pressure.

In this system, the established mean for diastolic pressure is 79 mm. and that for pulse pressure is 44 mm. Readings at these exact measurements are given values of 1.0. Other readings are given values less than 1.0 decreasing the further we pass away from the means. Thus, a diastolic pressure of 89 mm. and one of 69 mm. have the same score, and a pulse pressure of 35 mm. has the same score as one of 53 mm. Finally, we combine these two components into a complete score which is the product of individual pulse pressure and diastolic pressure scores. This is done because these two factors completely define any blood pressure measurement. But while both diastolic pressure and pulse pressure must have real values during life, there is no simple correlation between their values. Therefore, they can be considered as independent events, occurring simultaneously. Since the mathematical derivation of the individual score for each component is, to some extent, a measure of its probability of occurrence, the final score used is the product of the individual scores.

In using this scoring system, we calculate the score from the arithmetic average of readings for the two arms. We use the measurement of diastolic pressure at the 4th phase (change of sound) in calculating the score, except in special cases in which a chemical can easily produce circulatory collapse (e. g., nitrites). In these special cases we use the fifth phase reading.

Example: Pulse pressure ..... 37 mm.
Diastolic pressure ..... 71 mm.
Reading at point of intersection 41
Score 0.41

P	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	D
27 61	11	A	A																
28 60	13	13	13	13	12	11	A	A											
29 59	17	17	17	16	15	14	13	12	11	A	A								
30 58	22	22	21	20	19	18	16	15	13	12	A	A							
31 57	27	27	26	25	24	22	20	18	16	14	12	A	A						
32 56	32	32	31	30	28	26	24	22	20	17	15	13	11	A	A				
33 55	39	38	37	36	34	32	29	26	23	21	18	15	13	A	A				
34 54	46	45	44	42	40	37	34	31	28	24	21	18	15	12	A	A			
35 53	53	52	51	49	46	44	40	36	32	28	24	21	17	14	12	A	A		
36 52	60	60	58	56	53	50	46	41	37	32	28	23	20	16	13	11	A	A	
37 51	68	68	66	64	60	56	51	46	41	36	31	26	22	18	15	12	A	A	
38 50	75	74	73	70	66	62	57	51	46	40	34	29	24	20	16	13	A	A	
39 49	82	81	79	76	72	67	62	56	50	44	38	32	27	22	18	14	11	A	A
40 48	88	87	85	82	78	72	66	60	53	46	40	34	28	24	19	15	12	A	A
41 47	93	92	90	86	82	76	70	63	56	49	42	36	30	26	20	16	12	A	A
42 46	96	96	94	90	85	79	73	66	58	51	44	37	32	26	21	17	13	A	A
43 45	99	98	96	92	87	81	74	67	60	52	45	38	32	26	22	17	13	A	A
44	100	99	96	93	88	82	75	68	60	53	46	39	32	26	22	17	13	11	A

Fig. 2.
Chart for calculation of score for diastolic and pulse pressure readings. Read the diastolic blood pressure on the horizontal axis, and the pulse pressure on the vertical axis. Find the intersection of these two. The figure in the square at the intersection is 100 times the score

After much study of this scoring system we have come to consider scores between 0.11 and 0.20 as of doubtful normality, and scores of 0.10 or less as definitely abnormal.

It has been pointed out that the selective examination given a worker when he applies for employment should contain the criteria to be used in periodic checks to be made during employment. Therefore, the comprehensive selective examination should contain the described blood pressure measurements, and when the worker is to be exposed to a toxic chemical his blood pressure score should be greater than 0.10 (preferably 0.20 or higher). In applying this criterion, however, one situation must be remembered. When a worker applies for a job he is already under psychic pressure. He is obviously needing a job or he would not bother to apply. The extent of his need may be great. Often, he has not received a medical examination before—or at least not so comprehensive an examination as is given by many industrial medical divisions. To him the procedures required may appear almost as a personal affront and so still further increase his apprehension. Under such conditions many people show an unusually high systolic pressure with a normal diastolic pressure. As a result, the pulse pressure may be an index of psychic instability. It can be disregarded unless the worker is to be employed in a job requiring great stability, or exposure to a chemical affecting the central nervous system. But the recurrence of an abnormal score due solely to high pulse pressure (i. e., with normal diastolic pressure) during periodic examinations should be a matter for careful inquiry. (A study of the reasons for occurrence of such abnormal scores among work groups can be interesting. Thus, it has been found that a new foreman, in his efforts to increase or improve production—and, incidentally, justify his promotion—can so disturb young workers that a whole "flock" of abnormal scores, due solely to psychic causes, may result. The present war with its accompanying prospects of being drafted into the Army, has produced similar results.)

Registration and Analysis

NO PROGRAM of periodic examination is of any value unless its results are properly registered and frequently studied. Study is most efficient if it is made on a statistical basis. The best form of registration is one in which pertinent data is collected together and so can be analyzed easily. The less pertinent data can be obtained when necessary by reference to the original examination record.

For ordinary purposes the pertinent data includes names of workers in a given group, the dates of examination (by months, usually), and the results of blood pressure scoring. Fig. 3 gives a facsimile page of a group register, the data employed in analysis and, at the bottom, summarized results of the analysis. The page illustrated contains headings for the groups, space for names of individuals, and

YEAR
OCCUPATION

NAME	JAN			FEB			MAR			APR			MAY			JUNE		
		T	C		T	C		T	C		T	C		T	C		T	C
a. S	NAA*	3/5	3/5	AN *	1/2	1/2	NNN*	3/5	3/5	NN *	5/6	5/6						
J. B	NN	0/2	0/2	NN	0/2	0/2	NA	1/2	1/4	NA	1/2	1/4						
W. W	NA	1/2	1/2	NN	0/2	0/4	NNN	0/3	1/7	NN	0/2	1/9						
B. C	NNN	0/3	1/3	NNA	1/3	1/6	ANN	1/3	2/7	NNA*	1/3	2/8						
H. B	NN	0/2	0/2	NN	0/2	0/4	N	0/2	0/6	NN	0/2	0/7						
B. J	NN	0/2	0/2	NA	1/2	1/4	NN	0/2	0/6	N	0/1	1/7						
B. W.	AN	1/2	1/2	N.N	0/2	1/4	NN	0/2	1/6	NA	1/2	2/8						
E. C	N.N	0/2	0/2	N.N	0/2	0/4	A A *	1/2	1/6	NAN*	1/3	1/9						
Z. C				N.N	0/2	0/4	NNA	1/3	1/6	NN	0/2	1/9						
T. D	NNN	0/3	0/3	NAA *	2/3	2/6	NNN	0/3	0/9	NAA*	2/3	3/12						
J. E.	NN	0/2	0/2	N	0/1	0/3	NN	0/2	0/8	NN	0/2	0/9						
W. F.	NN	0/2	0/2	NN	0/2	0/4	N.N.	0/2	0/6	NN	0/2	0/8						
A. F.	A	1/1	1/1	ANN*	1/3	2/5	N.NN	0/3	0/8	NA *	1/2	1/9						
G. R	N.A	1/2	1/2	NN	0/2	1/4	AA *	2/2	3/6	NN *	1/2	2/8						
H. G	NN	0/2	0/2	NN	0/2	0/4	N.N	0/2	0/6	NAN	1/3	1/9						
G. V	NA	1/2	1/2	ANN*	1/3	2/6	N.NN	0/3	0/9	N.N	0/2	0/11						
C. H	NAA*	2/3	3/5	NAN*	1/3	3/8	NAN*	1/3	1/12	NNN*	0/3	0/12						
W. H	N.N	0/2	0/3	N	0/1	0/4	NN	0/2	0/8	N	0/1	0/13						
C. J	NN	0/2	0/2	N.N	0/2	0/4	N.N	0/2	0/6	NA	1/2	1/15						
J. M							NAA*	2/3	2/8	NAN*	1/3	1/17						
J. F.	N.	0/1	0/1	N.A.N	1/4	1/5	N.N	0/2	1/8	N	0/1	1/18						
A. R.	NA	1/2	1/3	NN	0/2	1/4	N.N *	1/4	2/8	NN	0/2	1/19						
H. P.	NN	0/2	0/2	N.N.	0/2	0/4	N	0/1	0/8	N.N	1/2	1/21						
C. O.	NN	0/2	0/2	N.N	0/2	0/4	N	0/1	0/8	NN	0/2	1/23						
F. J.	NNN	0/3	0/3	N.N	0/2	0/6	NAN	1/3	1/11	NA	1/2	2/25						
B. K.							N.N	1/2	2/13	NAN	2/3	3/28						

TOTAL MEN	23			24			26			26								
CHR. AB. MEN	2			5			6			9								
EX. ALL GP.		10/46	12/69		9/21	19/101		12/24	31/136		12/27	43/217						
EX. N-C. GP.		2/23	2/23		3/25	3/75		9/22	15/122		8/26	12/138						
RATIOS OBS/EXP. AB																		
C. MEN	0.67			1.67			1.50			2.00								
ALL EX.		(46) 1.43	(69) 1.43		(100) 1.33	(101) 1.33		(171) 1.99	(199)		(171) 2.46	(206)						
EX. N-C. GP.		1.00	1.00		0.84	0.77		0.63	1.26		1.20	1.21						

Fig. 3.
Form of group registration of blood pressure examination results for statistical analysis

opposite the latter, columns for entry of results by months (or any other convenient time unit). Each of these columns is divided into one large and two smaller columns. The large column is for entry of blood pressure scores as normal, N; or doubtful, D (i. e., 0.20 to 0.11); or abnormal, A (i. e., 0.10 or less). The narrow column headed, T, is for the total of abnormal and all examinations, entered as the fraction:

$$\frac{\text{No. Abnormal}}{\text{Total}}$$

obtained in the time interval of study (e. g., one month). The column marked "C" is for the cumulative total of abnormal and all examinations obtained by adding the total for the particular month (or other time interval) under study to the total of all preceding examinations since the group study was commenced. This cumulative total is also entered as a fraction. The meaning of the summary portion of the page will be given later.

In describing the purpose of the initial selective medical examination, it was pointed out that *the plant physician should know his plant and be able to classify the various health hazards so that he can properly allocate workers.* An effective preventive medical program requests that he make a proper survey of his plant. Such a survey can be based upon blood pressure readings and scores. Except when the plant is new, it need not be a mass survey. It can be made up of smaller surveys each of an occupation area. A fair idea of the general spread of hazard among occupations can be obtained from annual medical examinations, scoring the blood pressure measurements, provided that too many changes in equipment and processes have not occurred since those examinations were made.

Frequency of Abnormals

THE survey of degrees of hazard requires a yardstick of the frequency of occurrence of abnormal blood pressure scores.

Experience has shown that

(a) a worker selected initially as having a blood pressure score above 0.10, when subsequently examined a very large number of times, will not show a score of 0.10 or less as a result of chance alone (i. e., as a result of unexplainable causes) in more than 6% of all his examinations;

(b) a very large group of workers, initially selected as having normal blood pressure scores, when again examined once will not show 0.10 or less in more than 6% of all scores as a result of chance alone; and

(c) in a very large number of re-examinations on more than one worker, each worker being selected initially as having a score above 0.10, chance alone will not give more than 6% of all examinations with scores of 0.10 or less.

Since it is impossible at any given time to make a "very large number" of examinations in the statistical sense, the 6% figure must not be considered as applying to all groups of examinations. One must, in practice, use the mathematics of random sampling, arguing as follows:

Suppose a large bowl were to contain one million balls, all of one size but not thoroughly mixed. Six per cent of these balls (60,000) are black and the rest white. If, with a scoop, a random sample of 10,000 balls were taken out and found to contain 900 black balls, one should not reach the erroneous conclusion that 9% of all the million balls were black. If the random sample contained only 50 balls, it is quite possible that six of these are black, but one must not conclude that 12% of all balls in the bowl are black. (This is a common error in conclusions drawn from so-called statistics of clinical cases, when the incidence of deaths or cures is expressed as percentage.) It is possible to calculate the maximum number of black balls to be expected in a random sample of any size. The smaller the sample the more this maximum will depart from the overall 6%.

In using the 6% yardstick to study the frequency of occurrence of blood pressure scores of 0.10 or less in groups of examinations, we take into account the fact that any ordinary group of examinations is not statistically "very large," and use a figure for the maximum number of abnormal examinations expected by chance alone in a group of the size under study. Table 1 gives values to the nearest whole number for this maximum expected number of abnormals, calculated from the formula:

$$Y = 0.06\ N + 2\sqrt{pqN}$$

in which

$p = 0.94$ (the probability of occurrence of normal

examinations in a large group).

q = 0.06 (the probability of occurrence of abnormal examinations in a large population).

N = the number of examinations in the group.

To save space the group sizes are entered to the nearest 5. Thus, the expected number of abnormals for a group of 28 to 32 would be read as for a group of 30. For a group of 27 it would be read as for 25 and for a group of 33, read as for 35.

Abnormality Index *R*

A USEFUL index is obtained by calculating the ratio

$$\frac{\text{Observed Number of Abnormal Scores}}{\text{Maximum Expected Number}}$$

for any given examination group. This we prefer to term the "abnormality index" and give the symbol "R."

Normally, this index should not exceed a value of 1.0. When it is greater than 1.0, the group under study contains too many abnormal blood pressure scores. This is evidence, in our survey, of industrial exposure to toxic chemicals (or an unusual epidemic of disease, results of mass celebrations, or widespread malnutrition).

TABLE 1.

Total Exams.	0 Max. Ab.	5 Expected	Total Exams.	0 Max. Ab.	5 Expected	Total Exams.	0 Max. Ab.	5 Expected
1	1	1	200	19	19	400	33	34
10	2	3	10	19	20	10	34	34
20	3	4	20	20	21	20	35	35
30	4	5	30	21	21	30	36	36
40	5	6	40	22	22	40	36	37
50	6	7	50	22	23	50	37	37
60	7	8	60	23	24	60	38	38
70	8	9	70	24	24	70	38	39
80	9	9	80	25	25	80	39	39
90	10	10	90	25	26	90	40	40
100	11	11	300	26	26	500	40	41
10	12	12	10	27	27	10	41	42
20	12	13	20	28	28	20	42	42
30	13	14	30	28	29	30	43	43
40	14	14	40	29	29	40	43	44
50	15	15	50	30	30	50	44	44
60	16	16	60	30	31	60	45	45
70	16	17	70	31	32	70	45	46
80	17	17	80	32	32	80	46	46
90	18	18	90	33	33	90	47	47
						600	47	..

TABLE 1—CONTINUED

Total Exams.	0 Max. Ab.	5 Expected	Total Exams.	0 Max. Ab.	5 Expected	Total Exams.	0 Max. Ab.	5 Expected
600	47	48	800	61	62	1000	75	75
10	48	49	10	62	62	10	76	76
20	49	49	20	63	63	20	76	77
30	50	50	30	63	64	30	77	77
40	50	51	40	64	65	40	78	78
50	51	51	50	65	65	50	78	79
60	52	52	60	66	66	60	79	79
70	52	53	70	66	67	70	80	80
80	53	54	80	67	67	80	80	81
90	54	54	90	68	68	90	81	81
700	55	55	900	68	69	1100	82	82
10	55	56	10	69	69	10	82	83
20	56	56	20	70	70	20	83	83
30	57	57	30	70	71	30	84	84
40	57	58	40	71	71	40	84	85
50	58	58	50	72	72	50	85	85
60	59	59	60	72	73	60	86	86
70	59	60	70	73	73	70	86	87
80	60	60	80	74	74	80	87	87
90	61	61	90	74	75	90	88	88
						1200	88	..

The Plant Survey

TO MAKE the preliminary plant survey, collect the most recent examinations, one for each worker. Score the blood pressure readings and then break down the results into plant areas and occupation groups. The type of results obtained is shown in Table 2. In this table, the various items are given initials as follows:

S = total number of examinations in group studied;

A = number with blood pressure scores 0.10 or less;

B = maximum number of abnormals expected by chance alone in group of size S (Table 1).

To obtain plant or group score:

Count (A) Total number of examinations;

(B) Number of examinations with Pulse Pressure-Diastolic Pressure Score 0.10 or less;

Divide (B) by value of Max. Ab. Expected, given in table.

Score above 1.00 indicates too many abnormal examinations.

TABLE 2.
RESULTS OF PLANT SURVEY

Whole Plant—Total Examinations S–500
Observed No. Abnormal A–49
Expected B–40
Ratio ..... $\frac{A}{B}$–1.225*

Area 1	Area 2	Area 3	Area 4
S 125	S 200	S 75	S 100
A 15	A 12	A 5	A 17
B 13	B 19	B 9	B 11
R 1.15*	R 0.63	R 0.56	R 1.56*
Occupation	Occupation	Occupation	Occupation
(a) S 55	(a) S 75	(a) S 75	(a) S 82
A 6	A 2	A 5	A 12
B 7	B 9	B 9	B 19
R 0.86	R 0.56	R 0.56	R 1.33*
(b) S 30	(b) S 35		(b) S 18
A 5	A 3		A 5
B 4	B 5		B 3
R 1.25*	R 0.60		R 1.63*
(c) S 40	(c) S 50		
A 4	A 6		
B 5	B 6		
R 0.80	R 1.00 (?)		
	(d) S 40		
	A 1		
	B 5		
	R 0.20		

$R = \frac{A}{B}$ = abnormality index

This hypothetical survey shows too many abnormal examinations for

(1) the plant as a whole;

(2) areas 1 and 4; and

(3) occupations 1b, 4a and 4b.

Occupation 2c gives an abnormality ratio of 1.0. It is apparently on the borderline of abnormality. Its true position might be found by making another examination on each of this group and adding the results to the examinations used in the survey.

For allocation of new workers in this plant by the selective employment examinations, the order of increasing hazard by areas would be 3, 2, 1, 4; and by occupations, 2d, 2a, 3a, 2b, 1c, 2c, 1b, 4a, 4b. Only men with a perfectly normal selective examination including a blood pressure score greater than 0.10 and preferably greater than 0.20 should be allocated to occupations in which the abnormality index is above 1.0.

Analysis of Periodic Examinations

WORKERS in occupations offering a hazard to health from chemicals should be examined frequently. The time allowed to elapse between examinations will be conditioned by the speed at which the exposure produces physiological changes and by the convenience of the production department. The degree of protection afforded by ventilation, protective masks, clothing, etc., in relation to the toxicity of the compound, and the mode of its absorption must be taken into account. When absorption is mainly through the skin—and this is much more frequent than is generally supposed—it is considerably more difficult to protect workers than when absorption is only through the respiratory tract. In any case, for hazardous jobs, the periodic examinations should be made preferably at intervals of two to three weeks and should certainly not be more than a month apart. For jobs not hazardous, three, six, or even 12 months may elapse between periodic examinations unless changes in production methods introduce new chemicals. In such a case, a survey should be made as soon as the change occurs and repeated about three weeks later.

The program of periodic examinations should not be so rigid that any given worker is always examined on the same day of the week. Our general experience indicates that the incidence of abnormal scores is highest on the first day and the last day of the work week, (usually Monday and Friday). Examination of workers on these days gives the best index of the situation. Obviously, however, it is impractical in a large program to confine examina-

tions to two days. Therefore, as a compromise, days of examination should be so arranged that over a period of months, each worker is studied at least once on each day of his work week.

From these periodic examinations, answers to the following questions may be obtained:

(a) Does the group under study show too many abnormal examinations?

(b) Is this condition persisting?

(c) Is this due to a few men who repeatedly show abnormal blood pressure scores, or to the group as a whole?

The procedure in answering these questions is, in general, the same as that used for the general plant survey. It is as follows:

(1) Record the results of examinations in the register shown in Fig. 3.

(2) At convenient intervals; e. g., one month, count for the occupation group the total examinations and the number with abnormal scores as shown under column T; and using Table 1, find the value of R (ratio $\frac{\text{Observed}}{\text{Expected}}$ number of abnormal scores for the group). This answers question (a).

(3) Using the group total of data entered under Column C (cumulative totals), again calculate R. This cumulative total is important. While it is very convenient to divide study periods into units such as months, it must be remembered that the physical condition of neither worker nor plant is stable. The situation in one given month does not depend only upon what happens between 12:01 A. M. on the first day of the month and 12:00 midnight on the last day. It depends also on what has happened in preceding days, weeks and months. This is an important point in preventive industrial medicine. The weakest link in our chain of information lies in our past inability to assess the development of effects of chronic exposure. The cumulative method of studying blood pressure scores gives great assistance in filling this gap in our knowledge.

If, by the cumulative method a given group continues to give a value of R above 1.0, question (c) is important. The answer to this is obtained by the following steps:

(4) It has been pointed out that a worker, selected by an examination which requires a normal blood pressure score, when subsequently examined a very large number of times, should not show a score of 0.10 or less by chance alone in more than 6% of all his examinations. As in the case of groups, a statistically "very large" number of examinations is not obtainable. Therefore, again, one must employ the mathematics of random sampling and calculate the maximum expected number of abnormal examinations in the actual number of examinations made on the individual. Table 1 could be used, but greater accuracy is useful here. The maximum numbers of abnormal examinations expected to occur by chance alone in groups of various sizes are shown in Table 3.

Count the number of men who have been examined more than once in the period of study. (A man examined once only obviously cannot have more than his allowed number of abnormal scores.) Find the number of these who have shown more than the allowable number of blood pressure scores of 0.10 or less (Table 3). Using Table 1, find for the group of men examined more than once, the expected number of abnormal men and calculate R.

Example. In a group of 40 men, 35 were examined more than once in a period of study. Of these, six showed more than the allowed number of abnormal blood pressure scores. From Table 1, there should be no more than five abnormals in a group of 35 men. Hence,

$$R = \frac{6}{5} = 1.20$$

Men who show more than their allowable number of abnormal scores we term, "chronically abnormal," and we mark an asterisk on the register page in the month in which, by the cumulative totals, they reach this stage. So long as their cumulative totals show too many abnormals, the asterisk is continued. When, by a period free from abnormal examinations, they fall again into a normal group, the asterisk is omitted.

(5) Deduct the number of examinations and of abnormal examinations given by the chronics from the totals for the whole group. This gives the number of examinations and abnormal examinations for the non-chronic group, and R can then be calculated for this group.

In the summary at the bottom of Fig. 3, the abbreviations are as follows:

Chr. Ab. Men—the number of men who show more than their allowed number of abnormal blood pressure scores (0.1 or lower).

Ex. All Gp.—Examinations for whole occupation group entered as the fraction, $\frac{\text{abnormal examinations}}{\text{total examinations}}$

TABLE 3.

TO FIND MAXIMUM EXPECTED NUMBER OF ABNORMAL EXAMINATIONS GIVEN BY AN INDIVIDUAL

Total Examinations	Maximum Expected Number with Score 0.1 or less
1 – 6	1
7 – 14	2
15 – 23	3
24 – 31	4
32 – 41	5
42 – 51	6
52 – 62	7
63 – 73	8

Ex. N. C. Gp.—Abnormal and total examinations for the non-chronic group—obtained as given in Step (5) above.

Ratio - C. Men— $\frac{\text{Number chronic men}}{\text{Expected number of chronics as explained in Step (4).}}$

All Ex.—Ratio $\frac{\text{Observed}}{\text{Expected}}$ abnormal examinations for whole group.

Ex. N. C. Gp.—Ratio $\frac{\text{Observed}}{\text{Expected}}$ abnormal examinations for non-chronic group.

As in the general plant survey, a ratio with value above 1.0 suggests an occupational exposure. By the breakdown described in steps 4 and 5, it can be found whether the group ratio is due

(1) to a few chronics,
(2) to too many chronics, or
(3) to a general occurrence of abnormal examinations throughout the group.

If R for chronic men is below 1.0, then it is probable that individual factors cause some men to be chronic. If R for chronic men is greater than 1.0, it is extremely probable that exposure to a chemical is producing a chronic condition of abnormal circulation. If R for the whole group and for the non-chronic group is above 1.0, the exposure appears to be general in the group. (In such a case, R for chronics may be above or below 1.0.)

Development of Abnormal Scores

BEFORE discussing the use of results of the analysis described above, we will consider the development of abnormal blood pressure scores as shown by a study of thousands of examinations of workers exposed to a variety of chemicals, and a study, using exactly the same procedure, of laboratory animals exposed to chemicals under controlled conditions. We are not considering results of accidental acute exposures, but of low grade exposures of a type which is extremely frequent in industry and which can lead to chronic abnormality.

The trend of development of abnormal scores can be rather clearly divided into five stages:

Stage 1. The minimal concentration of a chemical sufficient, on absorption into the body, to cause detectable physiological change, can be withstood for a varying period of time without the appearance of symptoms or of significant changes in blood pressure score.

Stage 2. With the blood pressure score normal on the morning of the first day of the work week, there will be an abnormal score on leaving work on the last day of the week, but a week-end of proper rest restores normality.

Stage 3. With a normal score when commencing work on the first day of the week, the score at the end of that day will be abnormal, but proper rest overnight restores the normal morning level.

Stage 4. The rest overnight is inadequate to restore blood pressure score to normal, so that the degree of abnormality gradually increases throughout the week. However, the week-end of proper rest restores normality.

Stage 5. The week-end of rest is no longer sufficient to bring the blood pressure score back to normal.

If, at any point beyond stage 1 the worker is exposed, even for a short time, to higher concentrations of the harmful chemical, there may be a rapid deterioration in his condition. In fact he may respond in a manner out of all proportion to the intensity of this new exposure. His response may be more drastic even than that of a hitherto unexposed worker suddenly subjected to a very much higher concentration of the chemical. This mode of response may be the basis of the so-called "idiosyncrasy" of workers. It is often the source of the "temporary inadequacy" of personnel described above as a cause of accidents. This response is therefore of great significance.

It has been pointed out above that the physiological changes leading to abnormal blood pressure scores are not specific for any chemical but may be produced by factors other than chemicals. These include disease, malnutrition, self-medication or improper medication, fatigue, and sudden deprivation of oxygen. It is possible that any one of these factors may force a worker beyond stage 1. As a result he will become sensitive to concentrations of chemicals which usually will not affect him. It is also possible that a worker, forced beyond stage 1 by exposure to industrial chemicals, will suddenly deteriorate because of the action of one or more of these other factors.

At this stage it is important to discuss briefly the "external" factors (i.e., those external to industrial exposure), which act in the same manner as industrial exposure to chemicals.

External Factors

ABNORMAL blood pressure scores may be produced by any conditions which interfere with the normal metabolic processes of tissues. Thus, they may result from:

1. Improper nutrition (improper as to quantity, quality, timing, and especially vitamin content).
2. Improper medication (unnecessary or badly controlled use of the "sulfa" drugs).
3. Self-medication (the use of "pick-me-ups" containing drugs such as aniline derivatives; also alcohol).
4. Unnecessary exposure to abnormal climatic conditions.
5. Unnecessary exertion, leading to fatigue.
6. Disease (which is, in essence, chemical poisoning).
7. Deprivation of oxygen (resulting from sudden transfer to great altitudes or prolonged work in ill-ventilated enclosures).
8. Any combination of one or more of the above.

These factors may act quite independently of the worker's occupation. They are, very decidedly, situations over which he should have control, or might control, if he were properly advised. They are extremely important in industrial maintenance of health.

Nutrition

THE state of nutrition of the nation is receiving intensive study since Selective Service medical examinations disclosed a high proportion of men of military age with defects obviously due to faulty metabolism. Daily, evidence grows that many people have not received properly balanced diets. Claims that such is not the case are based chiefly on determinations of the vitamin content of raw foods. There is practically no information on the vitamin content of foods as eaten, i.e., after kitchen manipulations have destroyed part or all of the important components. Our own work has shown conclusively that exposure to chemicals can interfere with the ordinary metabolism of vitamins and that those exposed to harmful substances in industry can be protected, to a considerable degree, against the early signs of action of such materials by a maximum daily intake, especially of vitamin C and the B group. It is interesting to note that clinical C and B deficiencies can produce almost the same group of symptoms as are found in early action of toxic industrial chemicals. The lowered muscle tonus produced by chemicals may also be present in B^1 and C deficiencies.

In theory, dietary deficiencies among workers should be adjusted by proper education. Actually, an educational program has been carried on throughout this nation for many years, and apparently without success as yet. In war production, time is important. However intense the program of education now set up, regional traditions and personal fancies will act against complete success.

It is important to realize that the diet of workers must be adequate not merely as to quantity and vitamin content, but also as to distribution through the day. The total daily intake may be ample, but if confined to one large meal it may leave a rather long period during which the stomach is relatively empty. During the first World War, it was noted that improper distribution of meals could be a source of great disability in workers exposed to TNT. Many plant surveys show that men coming off the early morning (12 to 8) shift show abnormal blood pressure scores more frequently than workers on other shifts. This may be due partly to lack of adaptation to night work, but it also may be due to lack of proper distribution of food intake.

Control of the diet of workers is particularly difficult in war plants. The size and layout of many plants make it hopeless to expect men to go to a central cafeteria for lunch. It is difficult to assure both adequate food intake and cleanliness of eating conditions. In such circumstances it seems to us reasonable and proper to supplement the worker's diet by concentrated vitamin preparations, containing at least a daily dose of 1 mg. of B_1 and 100 mg. of vitamin C.

Medication

CHEMICALS used in therapeutics may have the same early physiological action as those absorbed in industrial exposures. In fact, physicians are in the habit of prescribing much higher concentrations of synthetic chemicals than are found in industrial exposures of workers.

The drugs of the "sulfa" group are proving extremely valuable when properly used. It does not detract from their value to point out that they are far too widely and too carelessly prescribed in clinical conditions for which they are not necessary. They have caused many cases of serious poisoning, but it has not been sufficiently emphasized that even single therapeutic doses can have marked and dangerous physiological effects. The following quotation from editorial correspondence in the *Journal of Aviation Medicine*[2] is significant:

"The use of sulfanilamide in the treatment of disease has increased our care of flyer problems. The British have found that a single dose reduces a pilot's ceiling about 5,000 feet. We have had one death just after flying, from it, and one collapse. It is easily obtainable by anyone and, in fact, civilian doctors prescribe it without a thought of danger in relation to flying."

It a pilot flies above his ceiling (12,000 to 14,000 feet) without using oxygen he may pass rapidly through all the early stages of action of toxic chemicals to a state of circulatory collapse. When under treatment with sulfanilamide and similar drugs he has progressed well toward stages 4 and 5 even before flying, and a sudden decrease in oxygen supply may prove disastrous. In industrial medicine, the early action of toxic chemicals closely simulates oxygen deficiency and may lead to as drastic results as are experienced in aviation.

Further evidence of the action of sulfanilamide is given by Houghton and his collaborators:[3]

"The mental and physical handicap of taking the drug in this dosage (2-3 grams daily) is greater than the psychological and physiological tests would indicate. Aside from the vomiting in two of the six cases, each of the subjects had a feeling of considerable malaise and mental incompetence. Such feeling was not conducive to good work in the laboratory during the period of the drug and *would undoubtedly impede the skilled activities of workers in industry or the military.* In emergency, however, a considerable amount of unskilled labor should still be possible, provided the subjects are free from vomiting."

An editorial note in *J.A.M.A.* on Mental Confusion from the Sulfonamides[4] refers to a report of the Committee on Disability and Rehabilitation, Medical and Surgical Section, Association of American Railroads, in which "it is recommended that a patient, after receiving treatment of this type, should be free from work for seven to 14 days following such administration, before being permitted to resume duties in either engine or train service. The possi-

bility of serious mental confusion must be borne in mind, especially for those whose activities under circumstances of impaired judgment would be particularly hazardous to others.

This would include many occupations in civil life and practically all those in military fields."

The effects of the "sulfa" drugs are rather lasting. We have record of at least one case in which a worker, having reached a state of circulatory collapse, failed to recover, with rest, in the normal period of two to six hours. He was under treatment with a "sulfa" drug merely because he showed an unexplained temperature rise. Actually, three weeks of rest were needed before a normal circulatory score was restored.

In a less serious degree the same situation applies to antiluetic treatment with organic arsenicals. Indeed, we wonder whether a luetic under active treatment is not in greater hazard, when exposed to harmful industrial chemicals, than one not so treated. This problem is important if there is exposure to substances (such as chlorinated hydrocarbons or aromatic nitro compounds) which may injure the liver.

Self-Medication

THE use of patented drug mixtures as treatments for headaches, etc., is widespread. Some contain aniline derivatives, which are quite active physiologically. Such self-medication can produce all early stages of chemical exposure and render a worker sensitive to materials to which he may be exposed in industry.

There is no need to point out that excessive indulgence in alcohol can be considered here as self-medication.

Extremes of Temperature and Humidity

UNUSUAL levels (high or low) of temperatures, and high humidity with high temperature, do not usually affect well-nourished normal persons. However, workers in the early stage of action of harmful chemicals react to high temperature (and to extremely low temperature) by rapid deterioration of circulation. In fact, a seasonal trend in the abnormality ratio obtained from the blood pressure scoring system is almost certain proof of a mass exposure to harmful material.

There are many possible causes of that trend, but the most important appear to be the following:

(a) With increase in temperature the atmospheric concentration of toxic materials may be increased. When temperature and humidity reach such levels that there cannot be free evaporation of perspiration from the skin, there may be increased possibility of skin contact with and absorption through the skin of toxic substances.

(b) The normal mechanism by which the body maintains its temperature involves a dilation of skin blood vessels in hot weather, and constriction of these vessels in cold weather. The peripheral blood vessels can hold a relatively large fraction of the total circulating blood. The diversion of blood to these skin vessels, on hot days may well cause such change in the balance of circulation that, when it is added to the change already caused by toxic chemicals, a worker may develop an abnormal score.

(c) When the atmospheric temperature is very near the temperature of the skin, heat loss by radiation becomes difficult.

This situation is aggravated when the air is still and humidity is high, and perspiration cannot evaporate. The perspiration then pours off the skin or is soaked up by clothes. It has been shown recently that significant quantities of vitamins C^5 and $B_1{}^6$ are lost in the perspiration so that, in extreme cases, prolonged work in hot, humid atmosphere can lead to clinically recognizable vitamin deficiencies. Vitamins B_1 and C (as well as others of the B group) are closely linked up with the oxidation-reduction processes in tissues. A relative vitamin deficiency caused by loss of vitamins in perspiration can, as has been described above, produce circulatory abnormality of the same type as, and superimposed on, that due to toxic chemicals. Further, there is evidence that, in absence of adequate vitamins B_1 and C, there is a loss of ability to detoxify chemicals. In either case, extremely high temperatures and humidities may, by producing loss of vitamins, aggravate the condition already existing in men affected by industrial chemicals.

Unnecessary Fatigue

OVER-EXERCISE, when away from work (especially during extremes of temperature) may have a great influence on the trend of resistance to chemicals. Often, in a routine program of study by blood pressure scoring, men are found to be in very poor condition on Monday morning, but improve greatly during the week. In spite of a minimal exposure to harmful chemicals, the work period may act more as a "rest" period than the supposed week-end rest away from work.

A very important factor in the Monday morning picture may be excessive automobile driving over the week-end. The fatigue of driving added to an improper food intake leads to physiological abnormality. There is too often, in addition, an exposure to carbon monoxide from exhaust gases. Few people pay much attention to the condition of mufflers and exhausts in their cars, and in cold weather they are apt to reduce ventilation to a minimum. It is well known that in congested traffic, significant concentrations of carbon monoxide collect in cars which follow closely in line. We have one record of a man who, after a week-end of driving, appeared at work in poor condition and suffered circulatory collapse an hour or so later, after a degree of chemical exposure which, as clearly shown by records made every two weeks for several months, would not usually give him an abnormal blood pressure score and which did not affect other men in his group on the day in question.

Disease

DISEASE due to bacterial infections or parasitic infestation is really the result of chemical poisoning and can produce all the stages of abnormality listed above. An attack of "grippe" or acute upper respiratory infection can advance a worker so far on the route of physiological change that he may react to a low concentration of a toxic chemical by a drastic fall in blood pressure score.

Deprivation of Oxygen

SUDDEN reduction in the available supply of oxygen, such as occurs in flying to high altitudes, or working in restricted, unventilated enclosures, will have the same physiological effect as toxic chemicals. Added to chemical exposure, deprivation of oxygen may have drastic results. Thus, Heim[7] has shown that "concentrations of carbon monoxide which are innocuous at sea level become dangerous at even moderate altitudes." This situation is not specific for carbon monoxide. It applies also to the action of hydrocarbon solvents used in the manufacture of paints and is operative when those paints are used in poorly ventilated rooms or cabins. It applies also to the household use of cleaning solvents, without proper ventilation.

Use of Results of Periodic Examinations

THE periodic survey of blood pressure scores made as described above will indicate:

(a) occupation groups showing too many abnormal scores;

(b) individuals showing too many abnormal scores;

(c) individuals showing at least one abnormal score.

A preventive medical program takes care of each situation as it arises.

If the group ratio shows too many chronic men or an over-all occurrence of too many abnormal scores in the non-chronic group, the immediate inference is that the group is suffering from industrial exposure to chemicals. (Only on rare occasions will it be suffering from an epidemic of disease or self-medication or alcoholism.) Immediate attention should be paid to the conditions under which the men work. These include atmospheric concentrations of toxic materials, possibilities of skin contact, efficiency of ventilating and other protective equipment such as respirators and gas masks; cleanliness of the work place, and personal cleanliness of the workers, and their clothing. Steps should be taken at once to remedy any defects found. The degree to which remedies are effective will quickly be shown by blood pressure scores.

Every worker showing too many chronic examinations should be studied carefully. His place of work, his manner of working, any differences between his possible degree of exposure and that of other group members must be noted. With assistance of the personnel division, every possible inquiry should be made concerning those "external fac-

tors" described above, which may contribute to his sensitivity to chemicals. In this inquiry the worker will usually give keen and grateful cooperation, once he knows its purpose—to keep him in the best possible state of health.

If the periodic examination program is properly conducted each man should be studied whenever he gives an abnormal blood pressure score. He should be re-examined within seven days and if the second examination is abnormal, as exhaustive an inquiry should be made as in the case of a "chronically" affected worker.

While in this description greatest emphasis has been placed on the occurrence of blood pressure scores of 0.1 or less, it must not be forgotten that any downward trend of score is an index of reduced normality. The occurrence of a score below 0.20 gives a very good warning of the trend of events. Additional warnings are given by any blood pressure readings on either arm which fall beyond the arbitrary limits given above.

The success of this or any other system of preventive medicine depends on unceasing vigilance and quick action when an unusual condition is disclosed.

Effects of Continued Abnormal Scores

THE physiological condition disclosed by an abnormal blood pressure score is at first merely functional. Given proper attention to its cause, it is easily reversible. Lack of attention, however, may lead to serious injury to health.

The rather anomalous situation exists that continuation of an abnormal score due to high diastolic blood pressure is often of more ultimate seriousness than continuation of abnormal scores due to low diastolic pressure. If allowed to continue, a diastolic pressure above 90 mm. may slowly rise to levels of 100 to 110 mm. even after complete removal of the worker from exposure to chemicals. Then, systolic pressure rises and there is established eventually both systolic and diastolic hypertension. Our records suggest that such conditions may be produced in workers below the age of 40 by prolonged exposure to low concentration of chemicals, which are usually considered harmless because they do not produce acute poisonings.

Continued abnormal scores due to low diastolic pressure often lead to circulatory collapse. After a time all three pressure components—systolic, diastolic and pulse pressure—fall to abnormal low levels. Inability of the circulation to compensate for changes in posture may lead to syncope by allowing the blood to pool in the lower part of the body. If a worker lies down with his head lower than his legs immediately he feels dizzy, the dizziness will disappear in a few minutes, and one or two hours rest, with inhalation of oxygen or an oxygen and CO_2 mixture, will restore his circulation to normal. If he persists in working, his condition may become so serious as to produce a severe circulatory collapse, sometimes with fatal results.

Index of Circulatory Balance

A USEFUL index of circulatory balance is obtained by employing the ratio

$$\frac{\text{Pulse Pressure}}{\text{Diastolic pressure} + 1/3 \text{ pulse pressure}}$$

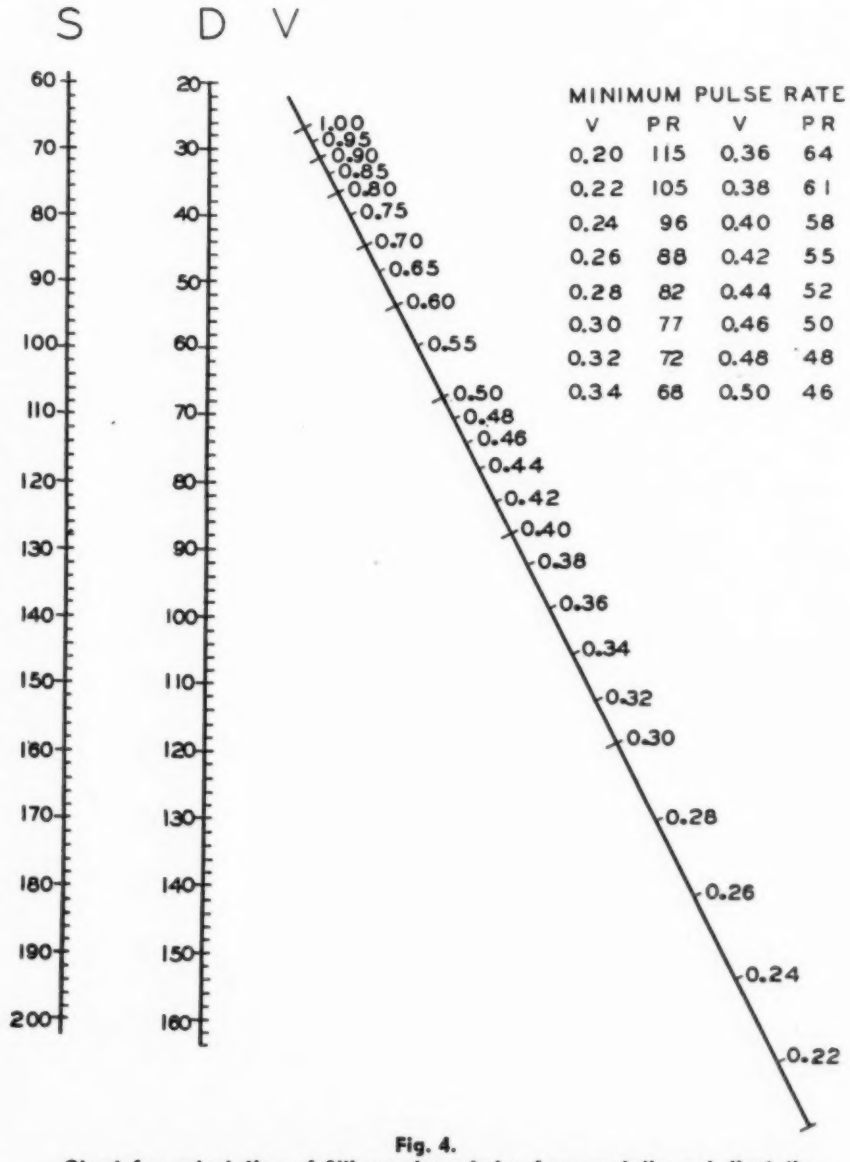
as an index of the filling volume of the heart. Fig. 4 makes easy the reading of this index (called Volume Filling Index, V) directly from systolic and diastolic pressure. In calculating it, use the arithmetic average of the systolic pressure and the diastolic pressure at the fourth phase (change of sound) on the two arms.

Our experience shows that a value for V of 0.3 or lower indicates impending circulatory collapse. A worker may reach a value of 0.3 or less and yet, by a reflex increase of heart rate, force enough blood from the heart to prevent circulatory collapse. We consider a value of 23.0 for the product of V by the pulse rate as a useful lower limit of normal. Fig. 4 includes a table of the minimum pulse rates giving values of 23.0 with different values of V.

The volume filling index and its product by pulse rate are very useful in following the development of and recovery from circulatory collapse. As illustrations, consider the following:

A worker, age 43, presented himself at a plant hospital early in the morning, pallid, with unsteady gait and slightly dyspneic. He appeared exhausted and claimed he was overcome by heat. His blood pressure (measured on only one arm) was 113/75, and his pulse rate was 58. This gave him a volume filling index of 0.43. This requires a minimum pulse rate of 54 for compensation. With a rate of 58 he was obviously near collapse.

Again, a worker came to a plant hospital covered with beads of perspiration and appearing on the verge of collapse. His pulse rate was 54. His blood pressure (on one arm) was 94/70. This gave a value of 0.31 for V, requiring a minimum pulse rate of 75.



MINIMUM PULSE RATE

V	PR	V	PR
0.20	115	0.36	64
0.22	105	0.38	61
0.24	96	0.40	58
0.26	88	0.42	55
0.28	82	0.44	52
0.30	77	0.46	50
0.32	72	0.48	48
0.34	68	0.50	46

Fig. 4.

Chart for calculation of filling volume index from systolic and diastolic blood pressures. To use this chart, simply stretch a piece of string or lay a transparent ruler across the chart in such a way that it cuts the reading of systolic and diastolic blood pressures and extends over to the volume index line. Read off the volume index and look at the table of minimal pulse rates to see whether or not the man's actual pulse rate is below or above that necessary for proper compensation

It is not implied that with values of V below 0.30, or of the product with pulse rate below 23.0, workers will necessarily collapse. But such values certainly give a limit for reference, and a warning for proper handling of individual cases.

Removal of Workers from Exposure

TO REMOVE a worker from his job because he continually shows abnormal blood pressure scores is merely to follow the path of least resistance. At the present time, such a practice can cause serious interference with production. If the scheme described above is followed properly, a man who gives an abnormal score on examination will be re-examined within a week. If the second examination again gives a bad score, investigation of the situation will be made at once and steps taken to remedy it. If, however, no solution of the problem is found by inspection of the conditions under and the manner in which the man works, or by collecting all information possible on the action of "external" factors, it is advisable to remove the worker temporarily from all exposure to chemicals. The new job to which he is transferred must be physically less arduous than that from which he is removed; otherwise, the increased exertion super-imposed on an already abnormal circulation will prevent recovery and may even cause injury.

During the period of temporary removal—which in most cases will not need to be longer than three weeks to a month—the man should be re-examined frequently, i.e., at least once a week. He should not be returned to work with chemicals until two examinations a week apart give normal scores.

When this goal is reached and he returns to his previous job, he should again be examined once a week for two or three weeks.

This is necessary because experience shows that a return to exposure to chemicals before adequate recovery from past action of those chemicals may lead to a sudden reduction in circulatory efficiency.

With proper conduct of the program outlined above, there should be only three causes for permanent removal from the job:

(a) A failure to recover normal circulation within reasonable time during temporary removal from exposure.

(b) A rapid return of abnormal scores when the worker goes back to the job after temporary removal.

(c) An intermittent injury or disease which renders him permanently unfit for the job.

Atmospheric Concentrations

IT WILL be obvious from our discussion of factors entering into the development of chronic poisoning of workers that there can be no general rule as to the atmospheric concentration of toxic vapors, dusts and gases, which can be considered safe. Yet various committees throughout the country are spending considerable time in trying to set up such so-called "safe" upper limits. These must necessarily be rather empirical figures obtained from studies of exposures to single chemicals. In industry, in the majority of cases, there are simultaneous exposures to a number of chemicals. The so-called "safe standard" can never take into account the cumulative action of the mixture of chemicals.

Such "safe standards," therefore while of use in assessing the relative efficiency of ventilation schemes, cannot be relied upon as an index of the degree to which workers are affected by their industrial exposure.

In using the blood pressure scoring system to detect minimal physiological action of chemicals, it is frequently found that there is a significant number of abnormal blood pressure scores in groups working in occupations apparently protected by very efficient ventilation systems. There may be at least two reasons for this: first, the chemical or chemicals employed may be absorbed through the skin in which case, of course, ventilation is no protection; and, second, the system of ventilation used may not be such as to remove vapors or gases at their point of origin before they can be inhaled by the workers. Most frequently the ventilation system depends upon dilution by throwing into the work area large volumes of "fresh" air from outside. When we consider the information given by our blood pressure studies, we realize that the actual dilution of the vapors, while bringing them much below the so-called "safe" upper limit, may still not be adequate to prevent all action of the toxic substance upon workers. If, in addition the intake air should be contaminated by chemicals from other work areas, there is actually produced a multiple exposure which, as we have already indicated, can have pronounced effects upon the worker.

It must be emphasized that the actual condition of workers cannot be demonstrated by air analyses or by citing facts as to the efficiency of ventilating systems. It can only be discovered by periodic medical examinations, adequate to detect changes in physiology before actual injury has occurred.

ALTHOUGH this system of preventive medical control of industrial exposure to toxic chemicals has required rather a voluminous explanation, in practice it is actually very simple.

It has been used, and is being used, in plants employing from 100 to 2,500 men. New sources of hazard to health are being disclosed by the preliminary survey method, and the efficiency of physical protective equipment is being tested and the effect of changes in production methods estimated by continuous use of the periodic examinations with blood pressure scoring.

For the moment, this scheme has been applied only in industrial medicine. It would probably be useful also in ordinary clinical practice, especially for study of the effects of therapy, surgical treatment, or stages in the development of and convalescence from an infectious disease. It will undoubtedly be of value in aviation medicine, for there the problems confronting the physician differ little from those of industrial practice.

The value of the scheme is quickly determined by proper trial. Its routine and careful use can add much information to our knowledge of the causes and development of industrial disability.

Our attempt to follow development of chronic poisoning by a study of the early physiological action of industrial chemicals has led us to the admission that exposure to chemicals may play no greater part than a number of other factors which lie outside of the worker's occupation. This should not be surprising. Man's life cannot be divided into clear cut time elements—day and night, work and play, 1935 and 1942. It is continuous. Man's physiological condition at any given instant is the integration of all that has gone before, and man's reaction, the next instant, to a change in environment necessarily depends upon the picture formed by that integration. The industrial physician trying to prevent ill health cannot confine his attention solely to the events of the work day. The 16 hours away from the job are equally important. The worker must be told how important they are. The family physician, treating his patient for a non-occupational condition, should remember that his therapy may also influence the patient's industrial life.

Maintenance of health in industry is a collective responsibility. Worker and employer, plant physician and family doctor all have a part to play, and each one's manner of playing may affect the others. Now that our very existence as a free nation depends on the output of war industries, and that in turn upon continuity and efficiency at the job, we must each accept our part in our collective responsibility.

There has never been a greater opportunity for the highest type of medical service.

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Rupture of the Pectoralis Major Muscle

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A RUPTURE of the pectoralis major muscle is comparatively rare. It is most apt to happen when the individual is attempting to lift from the shoulder level, swinging laterally, to place a heavy object in position. The following case illustrates this injury:

A.F., age 27, was using an overhead hoist. His arms were at shoulder level, parallel, and as he was attempting to place the object, weighing approximately 50 pounds, on a rack a little higher than shoulder level to the right of him, he felt a sudden, stabbing pain in his right axilla and went into shock. Physical examination at the time of the injury was not definite except for marked tenderness at the axilla. Diagnosis was tentatively made of possible fractured rib or spontaneous pneumothorax. X-rays of thorax were made and were negative. The next day at 11:24 A.M., patient was observed to have a right shoulder drop and a bulge

in the axillary fold. This can be seen in the accompanying illustration. All movements of the arm were extremely painful and there was marked tenderness at the insertion of the pectoralis region near the humerus. Treatment consisted of sling, with elevation of arm and physiotherapy. Conservative treatment only was used and resulted in recovery in about three and one-half to four weeks.

There was no permanent disability.

This case has been reported to illustrate the mechanism of the injury and the few signs and symptoms accompanying the rather unusual occurrence.

Modern Industrial Health Practice

Review by
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ESSENTIALS OF INDUSTRIAL HEALTH, by C. O. SAPPINGTON, M.D., DR. P.H. Published by J. B. Lippincott Company, Philadelphia. Approximately 600 pages; 63 illustrations. Pre-publication price, $6.50.

INDUSTRIAL medicine is the medicine of the man who works; because he works it is the medicine of that man in his reactions to his industrial environment, and this also involves the relationship of non-occupational factors to work. Thus while the mechanic with chronic stomach and intestinal trouble presents to the general practice of medicine a possible ulcer, the same man with the same symptoms presents to industrial medicine the possibility of lead poisoning or a mental reaction to a disappointment. The woman worker who falls in a faint usually presents to general medicine a nervous-physical problem—to industrial medicine the problem may be one having its origin in worry. The engineer who has long been unable to sleep without the use of a sedative suggests to general medicine a nervousness from physical causes—to industrial medicine there is likely an etiology based upon past experience which has grounded certain fears in his mental outlook. And so it is that the overalls and the slacks introduce variations in etiology which enlarge the view of industrial medicine.

This book covers these many ramifications and is written with the viewpoint of one who has been long associated with the headaches and growing pains of industrial health as a specialized field. The material has been selected with considerable care and expresses a degree of discrimination which could be based only upon long experience and the development of critical judgment.

A text of this sort has been long needed for those who are coming into industrial medicine for the first time and want to learn something elementary about it, but it will likewise be of value to those who are already in it and wish to learn more.

The outline of the subject matter falls into three main divisions. Thus, Part I deals with Industrial Health Administration; Part II with Industrial Hygiene and Toxicology; Part III with Industrial Medicine and Traumatic Surgery. The chapter headings—five in each part—express the subdivisions as follows: (1) Origin and Later Development of Industrial Health; (2) Occupational Morbidity and Mortality; (3) Distribution of Industrial Health Service; (4) Classification of Industrial Physicians; (5) The Industrial Medical Department; (6) Industrial Health Exposures; (7) The Plant Survey; (8) Plant Sanitation and Hygiene; (9) Personal Hygiene for Workers; (10) Co-ordination of Industrial and Community Health Services; (11) The Worker and the Job; (12) Industrial Accidents; (13) Occupational Diseases; (14) Non-occupational Disabilities; (15) Workmen's Compensation and Rehabilitation.

Augmenting the value of this work as a text, the outline is propitiously based on the combined reports of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and the A.M.A. Council on Industrial Health regarding medical school instruction in industrial health; the chapter headings correspond with the course content (with adaptations) as developed by the official recommendations of these organizations. The author has succeeded in clothing the skeleton outline with a well developed musculature.

Physicians and surgeons long identified with industrial medical practice will find that this book is good reading, consisting of an interesting organization of effects and developments with which they have been familiar, but which will appeal to them in the form and chronology in which they are set down. Safety directors will appreciate the thoroughness of the volume and the obvious authority of its content. It will appeal to the industrialist and others of his staff interested in employee health as a part or phase of employee relations; it will be found that the material can be used effectively in bettering labor relationships wherever these can be improved. As a textbook, guide and reference work "Essentials of Industrial Health" will be of great value in teaching for medical schools, nursing schools, personnel courses and business administration seminars, and for libraries in industries, schools and hospitals.

This is not a clinical book—that, however, is an advantage, because industrial *health* is primarily the application of preventive medicine and public health to industry; and the clinician is obviously found most frequently where there has been the least prevention. Nevertheless the book makes practical use of the lessons of curative industrial medicine and surgery, building on these the superstructures of industrial health. There may be also an apparent incompleteness of the material in certain respects, but this is more apparent than real when the whole perspective of the subject is considered and the comparative significances of the parts of the pattern are carefully evaluated.

The production of this book is an important event in the history and development of industrial medicine.

Industrial Medicine
Reg. U. S. Pat. Off.

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Nothing New

THIS seems to be an age of making things over, rewriting laws, breaking precedents, ignoring customs. And the scramble to put everything we have ever had or known on a different basis has become so hectic that the fundamental laws and principles of morality and decency have been left behind; indeed, they are almost forgotten. The two aggressor nations which have flouted them most completely—having written them clear off the books of their conduct—are now defending themselves more and more hopelessly against the rest of the world. But even the rest of the world does not seem as much interested in restoration to fundamentals as in fantastic plans for making new fundamentals. None of the nations has flatly declared that it is waiting or fighting for the return of mankind to the basis of sobriety, integrity, decency, unselfish sacrifice and honest toil—much less anticipating any re-recognition of such old fashioned ideas as the law of supply and demand, or the relation between cause and effect. Interestingly enough, however, the new set-up of all the rules and regulations of existence has to stop at the threshold of medicine. The security from "womb to tomb" which the givers of the abundant life hold out for the future may provide care for the man who is sick, but it will never prevent him from becoming sick. The relation between cause and effect may be temporarily set aside so far as a man's objective contacts are concerned, but he cannot escape it so far as he himself is concerned. The old copybook maxim about burning the candle at both ends may be laughed at—along with the other uncompromising pronouncements which everyone who ever saw a copybook is still able to recall—but, as every doctor so well knows, there is no security from the effects of a man's abuse of himself.

On the objective plane, the phenomenon persists that no one among those who are agitating the bright and beautiful new schemes of life has any realization that they are not new at all, but indeed have been tried and found wanting repeatedly, as any student of history is aware. Every once in a while throughout history someone inscribes an immortal line or phrase on the tombstones of their failures. Among the more recent of such things is Kipling's "Gods of the Copybook Headings," written in 1919. DR. THURMAN B. RICE, editor of Indiana State Department of Health's monthly journal, quoted this poem in his March issue, having received a copy of it from the Indiana State Chamber of Commerce, which is causing it to be distributed. DR. RICE'S comment concludes there is no greater need in business, industry and commerce than "exactly this attention to sound ideals." We include the poem here, with the observation that as to sound ideals, business, industry and commerce are still miles ahead of government.

As I pass through my incarnations in every age and race,
I make my proper prostrations to the Gods of the Market Place,
Peering through reverent fingers I watch them flourish and fall,
And the Gods of the Copybook Headings, I notice, outlast them all.
We were living in trees when they met us; they showed us each in turn
That Water would certainly wet us, as Fire would certainly burn;
But we found them lacking in Uplift, Vision and Breadth of Mind,
So we left them to teach the Gorillas while we followed the March of Mankind.
We moved as the Spirit listed, they never altered their pace,
Being neither cloud nor wind-borne like the Gods of the Market Place,
But they always caught up with our progress, and presently word would come
That a tribe had been wiped off its icefield, or the lights had gone out in Rome.
With the hopes that our World is built on they were utterly out of touch,
They denied that the Moon was Stilton; they denied she was even Dutch;
They denied that Wishes were Horses; they denied that a Pig had Wings;
So we worshipped the Gods of the Market who promised these beautiful things.
In the Carboniferous Epoch we were promised abundance for all,
By robbing selected Peter to pay for collective Paul;
But though we had plenty of money, there was nothing our money could buy,
And the Gods of the Copybook Headings said: "If you don't work, you die."
Then the Gods of the Market tumbled, and their smooth-tongued wizards withdrew,
And the hearts of the meanest were humbled and began to believe it was true
That All is not Gold that Glitters, and Two and Two makes Four—
And the Gods of the Copybook Headings limped up to explain it once more.
As it will be in the future, it was at the birth of Man—
There are only four things certain since Social Progress began:
That the Dog returns to his Vomit, the Sow returns to her Mire,
And the burnt Fool's bandaged finger goes wabbling back to the Fire;
And that after this is accomplished and the brave new world begins
When all men are paid for existing and no man must pay for his sins,
As surely as Water will wet us, as surely as Fire will burn,
The Gods of the Copybook Headings with Terror and Slaughter return!

THE BENEFITS OF MULTI-VITAMIN PREPARATIONS AS REPORTED IN THE RECENT A. M. A. ARTICLE.[1]

Between-Meal Eating

Often Cause Of "Hidden Hunger"!

Don't Let a Dietary Deficiency Sabotage Her

Industrial workers need all the food-energy they can get. When they fail to obtain it from "three squares" a day, most workers reach for a snack. Eating between meals may satisfy hunger . . . even increase ability to produce...but what about nutritional requirements?

Fully two-thirds of the calories in the average worker's diet are provided by refined sugars and fats . . . foods which are practically vitamin-free.[2] At the same time, other food factors considered essential are removed from the remainder of the diet by improper storage, processing and cooking.[3] As a result, millions of war workers are suffering the detrimental effects of dietary deficiency . . . "hidden hunger."[4]

How Can Industry Help to Improve Nutrition?

Many industrial plants already are sponsoring educational programs to improve nutrition among workers. But it may be years before real improvement becomes noticeable. Meanwhile, if nutrition is to be improved *now*, nutritional supplements must be applied.

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As a physician, you appreciate that a dietary deficiency cannot be attributed to the lack of one vitamin alone. In most cases, a deficiency in one vitamin is accompanied by a deficiency in others. Symptoms caused by missing dietetic factors may be so mild at first as to escape detection. Therefore, it is safer, and more desirable to prescribe a multi-vitamin preparation like VITULES as a nutritional adjuvant.

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Industrial and Wartime Health

—Abstracts of Papers presented at the industrial and Wartime Health Sessions of the Ninety-seventh Annual Meeting of the Ohio State Medical Association, March 31, 1943, Columbus, Ohio—

THE well attended and interesting sessions of the ninety-seventh annual meeting of the Ohio State Medical Association held at Columbus, March 31, 1943, featured in the morning program a symposium of subjects pertaining to industrial health, while the afternoon session was given over to wartime health and medical problems of the civilian population. The program was as follows:

General Session: "Keeping Them Working"

PRESENT Day Influences in Industrial Health," CHRISTOPHER LEGGO, M.D., Columbus, Ohio, Surgeon (R) U. S. Public Health Service; Director, Industrial Hygiene Service, Ohio State Department of Health.

"Essentials and Organization of Industrial Health Services," CARL M. PETERSON, M.D., Chicago, Secretary, A.M.A. Council on Industrial Health.

"Women in Industry—Present and Future Problems," H. CLOSE HESSELTINE, M.D., Chicago, Chairman, Committee on the Health of Women in Industry, A.M.A. Section on Obstetrics and Gynecology.

"Preventive Medicine in Industry," JOHN H. FOULGER, M.D., Wilmington, Del., Director, Haskell Laboratory of Industrial Toxicology.

Discussion and Question-Answer Period.

General Session: "Keeping Them Healthy"

IMPORTANCE of Optimum Nutrition for the Civilian Population in Wartime," TOM D. SPIES, M.D., Cincinnati and Birmingham, Alabama, Director, Nutrition Clinic, Hillman Hospital, Birmingham; Associate Professor of Medicine, University of Cincinnati College of Medicine.

"Importance of Immunization of the Civilian Population in Wartime," JOHN A. TOOMEY, M.D., Cleveland, Ohio; Professor, Clinical Pediatrics and Contagious Diseases, Western Reserve University School of Medicine.

Discussion and Question-Answer Period.

"Adjustment of the Physician to Civilian Needs in Wartime," EDWARD J. MCCORMICK, M.D., Toledo, Ohio; President, Ohio State Medical Association.

DR. LEGGO stated that Ohio was among the first five states in industrial production, that among the industries there are many stabilized types which would persist after the war. Most of these, however, have growing pains or headaches that need treatment.

A short review of the landmarks in industrial health was given: in 1907 a commission to study conditions in industry was appointed by President Theodore Roosevelt. Following this, came the adoption of laws in various states for workmen's compensation, among these, Wisconsin in 1911, Ohio in 1912; up to 1916 a considerable number of states passed such laws. Conditions were chaotic in industry previous to the passage of these laws, but even so, there were many states which did not see the necessity for compensation and certain groups were against this type of legislation. These laws, however, had a very salutary effect in creating interest which culminated in the founding of the National Safety Council in 1914, leading to the development of safety engineering which has become such an important ally of physicians. In 1914 also the American Public Health Association established its Industrial Hygiene Section which, in recent years, has been very well attended. In 1916 a group of physicians founded the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS in Detroit, which has remained a strong influence in the building of standards of medical service in industry.

Many employers are now willing to go further than the statutory requirements, realizing that this is necessary to secure safe and healthy working conditions. In this connection, the importance of personnel and industrial relations cannot be overemphasized. There is now a growing demand for physicians to report to top management in-

stead of to other officers in other types of departments. There has been some confusion as between administration and function. It appears that physicians are different from other persons in industry because the physician was a doctor before he came to do industrial work and can still function as a private physician while doing industrial work.

In 1920 employers and insurance carriers realized that the best care was the cheapest in the long run. In 1929 Dr. Louis Schwartz's work in the Dermatoses Investigation Division of the U. S. Public Health Service simplified the principles of the prevention and care of industrial skin diseases. By 1935 the U. S. Public Health Service had evolved a pattern for the industrial hygiene units which were to be placed in the health departments of the various states—Ohio had pioneered in this work for some time before. In 1931 the American College of Surgeons established minimum standards for medical and surgical services in industry, which did a great deal to point out and make known what these standards should be. In 1937 the A.M.A. Council on Industrial Health was formed; since that time it has been realized that the A.M.A. is the common denominator in industrial health education for physicians.

We face an everchanging picture in the kaleidoscopic advance of industrial health work—never have industrial hygiene, industrial medicine and industrial health been so important. There has been, of course, one considerable defect—the shortage of trained personnel to carry on this type of work. There is a great need for courses on industrial health for nurses, emphasizing standing orders. The Health Department of Ohio is sponsoring such courses in this state.

Nurses have only recently been organized in any way with regard to industrial work, and their activities constitute a valuable addition to industrial medical programs and industrial health procedures.

Health is actually a function of the state health department. Engineering methods of control of hazards obey physical laws, but this is not true of human personnel, as is well known. The service rendered by the industrial hygiene units in the various state departments help to control industrial hazards which are usually unknown or unappreciated by a great many persons, and this work needs a specialized personnel.

We must discriminate between industrial and community responsibility, but cooperation can solve the problems of both. All of these are directly related to the medical profession.

In conclusion, whatever principles are adopted as official by the Ohio State Medical Association, the medical profession of this state can be well assured of the full cooperation of the state health department.

DR. PETERSON, in speaking on "Essentials and Organization of Industrial Health Services," stated that we now know enough to control most industrial exposures. The great need, however, is to apply this information on a wider basis and more significantly where it is needed.

An adequate health service in industry is expected to include the following: (1) a properly prepared physician who can emphasize the preventive aspects of medical problems in the industrial environment; (2) competent industrial nurses; (3) an industrial hygiene consulting service freely available; usually these types of services are found in the health departments, and ordinarily the physician is not experienced in this phase of the work; (4) the coordination of community services; (5) health education for employees; and (6) adequate record systems.

It is usual in the development of a health service that the nurse may spend part time in the industrial establishment, later be put on full time, during which period a part-time physician may be engaged, and finally, there is a full time physician and a fully developed staff for health services.

Educational services for employers have been developed in the past and are continuing to be developed; notable among these were the clinics given in various industrial communities by the National Association of Manufacturers during the past several years, and just recently the Chamber of Commerce of the United States has appointed

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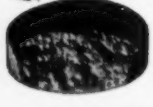

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a commission on industrial health to act in an advisory capacity in three phases; industrial, community and individual health problems.

The problem of medical organizations is to bring to the physician the realization of his opportunity and responsibility in this field. The picture starts with the provision for proper undergraduate teaching (these elements having been outlined elsewhere); consisting also of refresher and post-graduate courses for established practitioners; and specialized courses for men who expect to occupy full time in industry.

It has been considered wise by the A.M.A. to use the structure of the state and county medical societies for the presentation of industrial health education to practitioners, and there are now 45 jurisdictions in which this work is being carried on—some of the work has been quite well done, and in other places it is still in the developmental stage. The committees which have been appointed in the various state and county and local societies have been composed of a representative of the private practitioners, a representative of industrial practitioners (usually an industrial medical director of a representative organization) and a representative of the local health department.

Experience has shown that it is desirable for the medical profession to keep acquainted with the major problems and the specialized personnel in the field of industrial health.

There have been also meetings of employers and physicians to consider common problems; cooperation of labor has been solicited, especially in the spread of health education among employees.

Finally, it can be said that it is the responsibility of the medical profession to continue to be the leaders in this field of endeavor—if the medical profession itself does not assume this leadership, somebody else will assume it for them.

DR. HESSELTINE presented the subject "Women in Industry — Present and Future Problems," mentioned the increasing problem in the employment of women in industry, and stated that he would deal with problems peculiar to women only in his presentation. Some of the important factors in adapting women to industry may be stated as follows: the work should be suitable for women, and women employees should be able to do the work; the work should be carried on safely, and there should be generally accepted standards of fitness; conditions of work should be acceptable both to employer and employees.

Reference was made to the preliminary report of the Committee on the Health of Women in Industry of the A.M.A. Section on Obstetrics and Gynecology and some of the points in that report were discussed. It is advised that an obstetrical and gynecological examination be made at entrance to employment in order to avert difficulties which may later take place unless such examinations are made. The records of these examinations should be kept confidential.

There has been a decided increase in the employment of women in industry, an increase of 35% from 1940 to 1942 and an increase of 300,000 women employed in January and February, 1943. It is expected that 36% of available women will be employed this year.

The various problems of dysmenorrhea, pregnancy and menopause were duly considered. In pregnancy, it is known that women have been successfully employed during the first 32 weeks of this condition, although it is emphasized that each individual must be judged according to her own condition and her capacity. A heavy schedule of home work is quite undesirable in such instances. Home duties have become quite a problem for employed women—many times they do as much work outside industry as inside. Dysmenorrhea and the menopause are not industrial problems, but they can be met by an advisory service and the individual can be greatly helped in these difficulties.

An increased birth rate means an increased turnover, and this is likely to happen in the future. A pregnant woman in industry should have individual attention, should have duties restricted to certain types, and should work on regular shifts. Prenatal care should be given by her personal physician. Exposure of the pregnant woman to various poisons was mentioned, and the necessity for

proper protection in all respects was strongly emphasized.

Various causes of dysmenorrhea were discussed and corrective measures outlined.

In Ohio, there are over 100 employed women per physician. The cooperation of private and industrial physicians is indicated for the proper care of industrial women employees.

The program recommended was outlined, and it was stated that this could be carried out with proper cooperation of medical practitioners of all types—the program should include consideration of menstruation, pregnancy and the menopause, with correlative problems. In this program it is but natural that guidance should be obtained from those who have had considerable experience.

DR. JOHN H. FOULGER presented the subject "Preventive Medicine in Industry," which was the last subject on the morning program.

Have we learned anything from history about industrial health, and how have we applied it? This is a very important question and one which concerns the philosophical phase of our work. Reference was made particularly to the report of the Chief Medical Officer in the Factory Inspection Division of Great Britain, especially concerning the greatest number of preventive activities as compared with curative practices. The Report of the Ministry of Munitions of 1916 was also cited.

The situation is a challenge: we have not advanced in preventive medicine comparably with the advance in production, and we have never taught in medical schools preventive medicine of the type needed by industry.

The Haskell Laboratory is a center for the development of information on prevention for the plants of the company, for the customers, and for the ultimate consumers. There has been developed the principle of uncovering hazardous occupations and following these by preventive measures. Such a program can be based only on physiological principles and the departure of physiology from good health—it can never be based upon experimental animal deductions nor on pathology. There are two procedures which are relied upon in such a program: (1) an adequate pre-placement examination and (2) the observation of employees on the job at frequent intervals, usually every two weeks.

Lantern slides were used to illustrate a diagram in which there were charted a range of effective preventive medicine as compared with a range of diagnosis and pathology.

It is obvious at the outset that we must select a practical examination procedure and one which can be easily and readily applied. It has been decided that this is represented by blood pressure readings and changes, the technique having been described elsewhere (see pages 214-225, herein).

There are many factors outside the working environment which may affect the blood pressure. It is not to be assumed that these non-industrial causes are unavoidable nor are they reprehensible. The diet, for example, is very important and a real factor in absenteeism, because employees have found that it is necessary to get good meals and also to have time to buy food for the family. Drugs also may affect the blood pressure, and there may also be psychological factors in the adjustment to the human environment, which may alter the blood pressure.

From observations made in these studies, it is believed that a great many accidents can be prevented and controlled to a great extent by controlling malaise. This means, therefore, that the causes of malaise must also be controlled, whether they be industrial or non-industrial.

In conclusion, it was stated that the future offers a great opportunity in this phase of prevention.

DR. TOM D. SPIES presented the first number on the afternoon session, entitled "Importance of Optimum Nutrition for the Civilian Population in Wartime."

Colored lantern slides were used to very good effect in illustrating different types of food deficiency diseases, among them pellagra, beriberi, rickets, scurvy, and trench mouth, which sometimes accompanies pellagra.

It is of course important to recognize that we cannot have rationing and nutritional control without some con-

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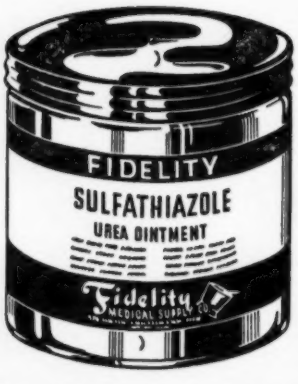

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flicts. It was also emphasized in the beginning that nutrition involves many types of compounds and many problems in the use of these compounds.

Dramatic results have been obtained, as evidenced by lantern slides, in the use of nicotinic acid in the control of pellagra where lesions appeared on the legs, on the neck, and giving a scarlet red color to the tongue—some of these cases responded after six hours.

It was demonstrated that pellagra produces lesions of the skin, edema, and also a psychosis. In beriberi, there is very often enlargement of the heart; an illustrative case showed how the size of the heart decreased in the radiogram in 48 hours after being on thiamin therapy. Incidentally, ordinary milling takes out about 90% of the thiamin from wheat, the idea being that it gives a whiter flour and that there is less chance for weevils in this kind of flour.

Cross-sections of atrophic nerves were shown which occurred in cases of food deficiency. Moreover, the relationship of blood deficient in oxygen and deficient in glucose was shown in thiamin deficiency.

In riboflavin deficiency, it was shown that there are sores at the corners of the mouth, and that there is a marginal blepharitis, also manifesting itself by congestion and dilatation of the conjunctival vessels, occurring in one or both eyes, and also characteristically giving a magenta tongue. Not all of these signs may occur together, but they may occur in some combinations or alone.

As indicated, trench mouth sometimes accompanies pellagra and is helpful by nicotine acid therapy.

In scurvy, there are healed ulcers of the gums. Vitamin C is probably the most deficient vitamin in the American diet, because a great many people fail to get grapefruit or orange juice and tomatoes; the second most prominent deficiency of the vitamins is riboflavin.

It has been important to take a very careful nutrition history in which the dietary habits of the individual are emphasized, and also to make a complete physical examination, forms for these being shown on the screen.

An interesting fact about pellagra is that it is highest in incidence in June and lowest in February. Rickets still continues to be a rather common disease, affecting the bones of the skull and the legs, as shown in x-ray photographs.

Food deficiencies also affect animals, both dogs and cats showing what is called "black tongue."

Posters in color were shown on the screen, depicting the different types of meals and badly-balanced, as well as well-balanced, diets.

Practically all bread and flour are now enriched, and it is expected that probably more milk will be used in bread in the future.

In conclusion, it was emphasized that there are certain important principles in the preparation of food, among them: do not peel or cut up vegetables and let them stand for some time—cook whole if possible and save the water in which they have been cooked—this should be used because it contains important food elements; do not add soda to the cooking water. Do not sieve vegetables while hot. Either boil or stew foods; never fry them if it can be avoided; do not chop or crush vegetables and fruits and let them stand for an considerable time before eating. Frozen foods should be cooked while frozen; if they are to be eaten raw they should be used after thawing.

DR. JOHN A. TOOMEY discussed "Importance of Immunization of the Civilian Population in Wartime."

Infectious diseases will present a considerable problem unless immunization procedures can be practically adapted to the civilian population. All persons should be protected against smallpox, and vaccination should be done as soon as possible after birth. If exposed to the disease, the individual should be re-vaccinated. The vaccine should be kept on ice to preserve its potency. The best method is scarification and no shields should be used. It should be emphasized that protection is variable and highly different in different individuals.

Diphtheria is variable in incidence in different places. The Shick test is a good one, but not infallible. Most children give a positive test. The test should be read in four

to five days to exclude unreliable local reactions which occur during the first 36 to 48 hours. Toxoid is more stable and dependable for immunization.

Gastro-intestinal infections cause a great deal of disability. For these paratyphoid A and B have been used, but are not necessary in large cities where water control is exercised, except in catastrophies.

Any bite from a rabid animal should be cauterized and if it is discovered that the animal is actually rabid by scientific proof, the patient should be immunized.

Tetanus exposure is common in the army and an individual should be immunized by tetanus toxoid; if there is further exposure, there should be a booster dose used, but a cutaneous test should be done for possible sensitivity.

Pertussis vaccine is best given at the age of six to nine months. Scarlet fever immunization is preferably done after 18 months of age, and a skin test should be done on all, vaccine being used on the positive reactors.

Cholera is now important in the armed forces; three doses of vaccine are given and repeated in four to six months. Serum does little good in most instances.

In bubonic plague it is important to remember that certain rodents are carriers and are frequently found in large cities. Vaccination for yellow fever develops very rapid immunity.

The treatment of various epidemic diseases was outlined at considerable length.

In summary, the recommendations of the American Academy of Pediatrics with reference to immunization against contagious diseases were read.

DR. EDWARD J. MCCORMICK, retiring President of the Ohio State Medical Association, completed the program of the day by discussing "Adjustment of the Physician to Civilian Needs in Wartime." It is to be understood that the ideas in this presentation are those of the speaker and are uncensored and do not represent the ideas of the Ohio State Medical Association.

In 1787 the Constitution of the United States was drawn up by a group of 55 men who varied in age from 25 to 82; 29 were university graduates. Certain inalienable rights were conferred by this document. We have produced the best in many lines, including medicine, in the United States. Democracy has made possible a great profession. There has been a record made since Pearl Harbor, as there are now 40,000 physicians serving in the armed forces; "the show must go on."

The Procurement and Assignment Service has rendered great help at considerable expense, both locally and nationally. We are now concerned with meeting the quota of the state, as well as conserving civilian health. Medicine has in reality taken three jobs, a service to the armed forces, a job on the home front, and also a job involving war work and longer hours.

The program of the Committee on Industrial Health in the State of Ohio includes (1) health education in industrial plants; (2) reduction of absenteeism in war industries; (3) cooperation between workers, family physicians, and community facilities; (4) an active cooperative program with management and labor in "a preventive campaign;" and (5) post-graduate courses in industrial hygiene.

Reference was made to the War and Postwar Planning Commission and the reaction of the *New York Times* to this meeting.

Peace with regimentation is not the American way (Hoffman). American medicine is threatened as to its freedom, the Beveridge Plan including medical care from the "womb to the tomb." We must do our part as community leaders to preserve the American way.

A discussion was given of a prepayment medical service plan for low income groups under the control of the medical profession; it is believed that it is necessary to cope with certain changes, and that such a plan had best be under the jurisdiction of the medical profession and not under other influences.

Medicine must help preserve Americanism—medical men and women are in two wars, a war of service and an economic war—we must retain the American way of life and be true to those whose blood has bought this freedom.

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Industrial Health and the War

—Statistical Analysis of the Medical Causes of Absenteeism—

DANIEL L. LYNCH, M.D.,
Medical Director,
New England Telephone and Telegraph Company,
Boston

OUR country has a war to win. President Roosevelt has said that it will be won by industrial production, that is, by the production of overpowering numbers of planes, tanks and guns and all manner of weapons and ammunition, and of fighting ships and of freighters, to bring all these arms safely and abundantly across the seas that our allies and our gallant men around the world may victoriously finish the jobs they are about. It is apparent, therefore, that our sailors and soldiers on the firing lines and our "soldiers" in overalls on the production lines are entirely dependent on each other.

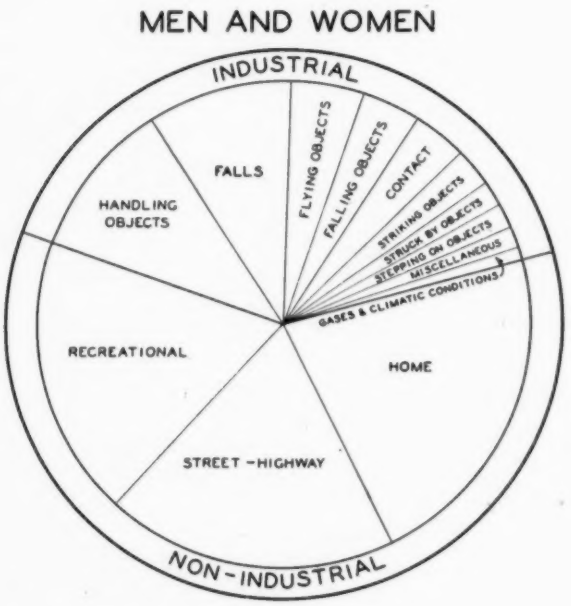
If production fails, our army is without weapons; if our armed forces fail, the workers in industry will become workers in chains.

Thus, the worker in industry, not only in essential war industry, but in practically all industries,—because today nearly all are contributing something to the war effort,—has been given a place of special prominence in the conduct of the war.

His ability to measure up to it depends heavily on his physical fitness, his freedom from preventable disease and injury, his mental stamina and his morale. Thus, loss of working time, especially by skilled workers, no matter what the cause, must be regarded today as equivalent to casualties.

It becomes, therefore, our patriotic duty as physicians

Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 27, 1942. Published in the *New England Journal of Medicine* 227:209-216 (July 30), 1942, and re-published here by special permission.



Lost Time Accidents, Year 1941

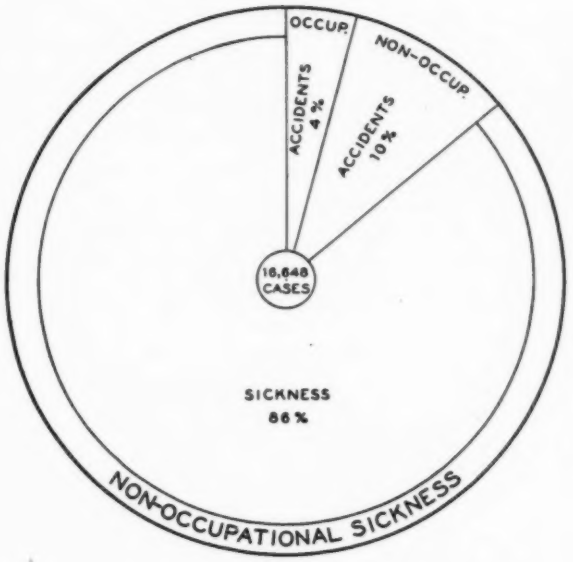


Fig. 1.
Distribution of Lost Time, Occupational Accidents—One Day or More, Non-Occupational Accidents and Sickness—Eight Days or More, Men and Women, 1936-1940

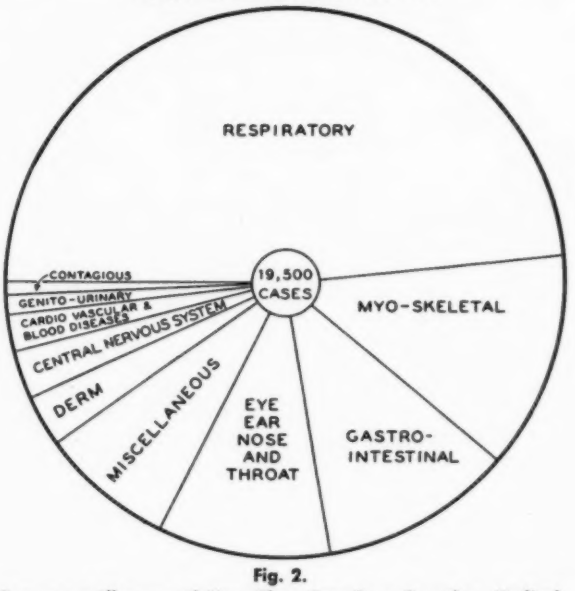


Fig. 2.
Frequency, Illnesses of More Than Two Days Duration, Medical Diagnosis, Men and Women, Year 1941

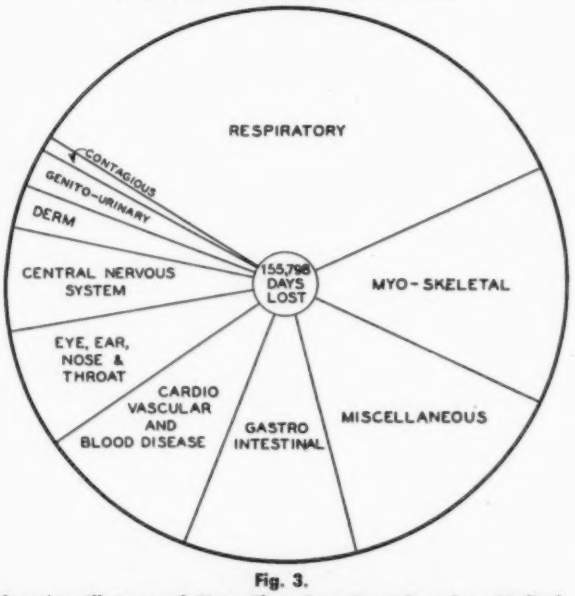


Fig. 3.
Severity, Illnesses of More Than Two Days Duration, Medical Diagnosis, Men and Women, Year 1941

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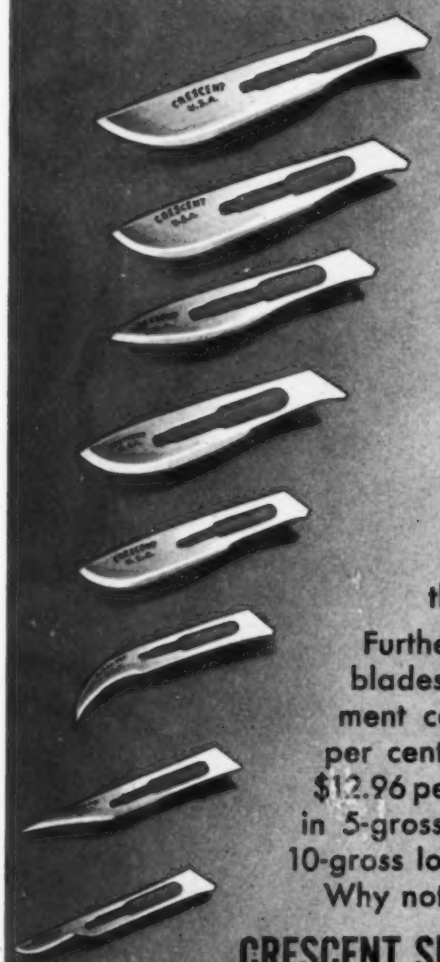

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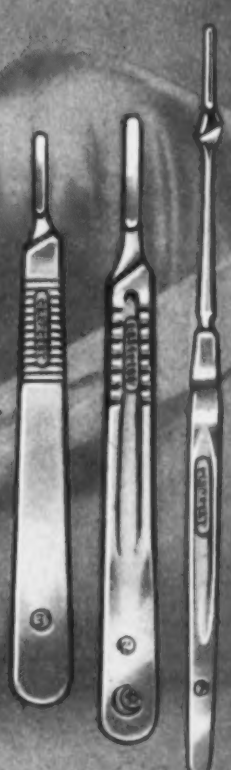

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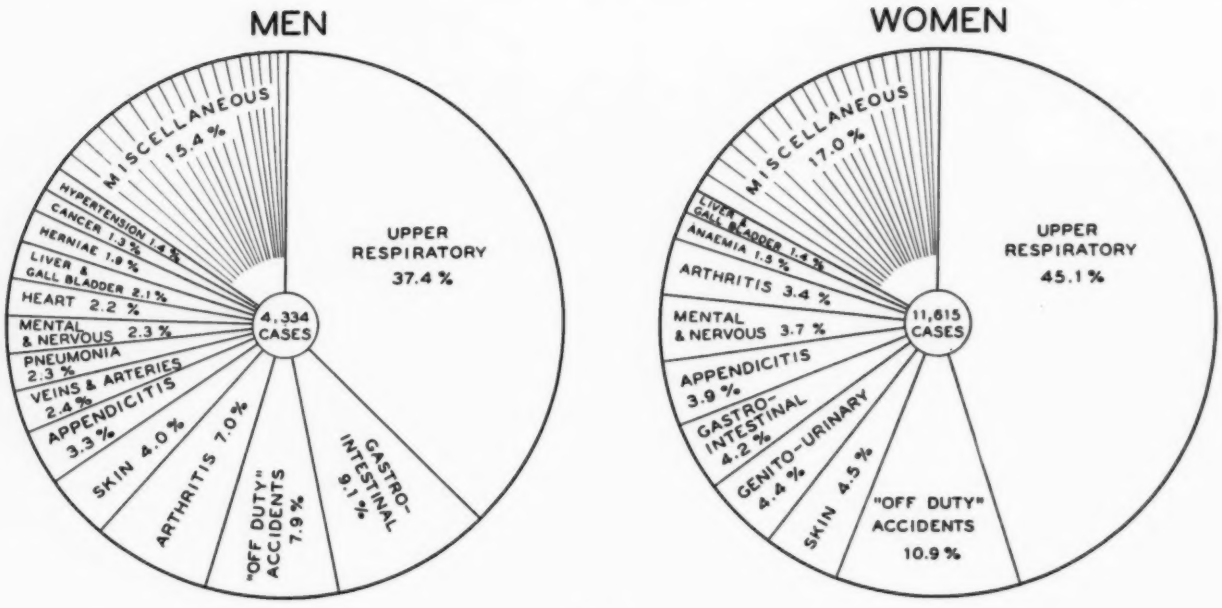

Fig. 4.
Sickness Disability Frequency, Absences of Eight or More Days Duration, Distribution of Cases, According to Diagnosis, 1936-1940

to contribute our best efforts to the conservation of the health of these necessary men and women in industry, so that the loss of precious work hours may be minimized.

Probably, few persons, especially persons not in industry, fully realize the demand that this war has put on the industrial manpower of the country: to build up the armed forces and to produce all the material that the armed forces will need to win the war. And probably, few persons appreciate the magnitude of the losses of manpower from industry incurred through accidents and, especially, non-occupational sickness.

If plans progress as scheduled for this year, the Army will be increased to 3,600,000 men, and the Navy and the Marine Corps to 1,000,000 men, a total of 4,600,000 men, virtually all of whom will have been drawn from the main industrial force. Eventually, the Army may be increased to 8,000,000 or more men. And they are the men best qualified physically and mentally for industry. They have formed the framework of all industrial production.

In peacetime, 34,000,000 out of America's labor force of 52,000,000 persons are employed in industry. Of these, about 9,000,000 have already been shifted to direct war-production activities. Watchmakers have become blacksmiths, and dungarees have replaced white collars. The number must be increased this year to approximately 18,000,000 persons to meet the production schedules laid down by the President. War this year will be the business of more than 22,000,000 of our fellow citizens. It will mean that half of all the men in the country between the ages of 20 and 65 will have been taken into the armed forces or into war production before the end of the year. It will mean the continued shifting of industrial workers from peacetime pursuits to war production, to jobs with which they are unfamiliar and with hazards to their health and safety. It will mean the absorption into war industry of several million women now engaged in home duties or unemployed whose health deserves protection. It will mean the employment in industry of the somewhat reckless young men and women between 17 and 19 years of age,—major accident risks,—of men past 60 years of age and of many physically handicapped persons—girls without fingers or with immobile hands and fingers, one-eyed per-

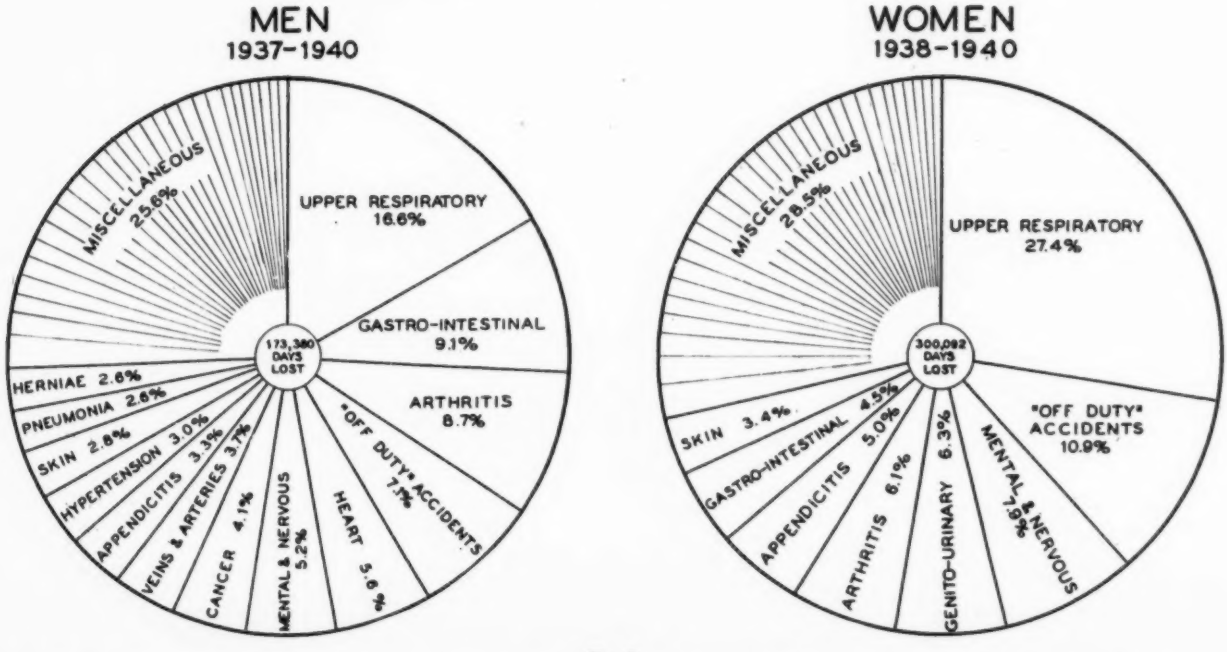

Fig. 5.
Sickness Disability Severity, Absences of Eight or More Days Duration, Distribution of Cases, According to Diagnosis

Acceptability

A CARDINAL FACTOR IN EFFECTIVENESS

● Physicians are in agreement on the importance of the acceptability of a contraceptive method to the patient and her husband. Any feature of a method found unfavorable by a wife or husband may result in disuse of the method, or abandonment, with consequent loss of efficiency. The problem of acceptability has received particular attention in the formulation of Ortho-Gynol.

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*Human Fertility, Volume 6, No. 6, Page 168, December 1941

sons and the like. It will mean that industries not directly engaged in war production, but nevertheless essential to the war effort, such as agriculture and the public services, and industries essential to the preservation of civilian morale will absorb the less physically able to work of America's labor force. It will mean an appreciable increase in accidents, occupational diseases and non-occupational illnesses unless adequate protection for the health and safety of all these workers is provided.

Our country has the manpower and the womanpower to win this war, if they are kept vital. Therefore, industrial health becomes an acute problem: the world's greatest production unit must continue to emit the deep and resonant hum of machinery working at full efficiency.

When Japan sneaked into Pearl Harbor, everybody was grieviously shocked by the report that 2600 young men had been killed. Few of us, however, are seriously impressed by the very much larger number of fatal and other accidental injuries daily occurring in civilian life—a most unfortunate situation in these days when every available man is needed, and when every hour counts in our industrial production for war.

The aggregate loss of manpower from industry because of accidents arising out of and in the course of employment is startling.[2] It is generally estimated that actual lost time owing to temporary disabilities sustained in occupational accidents in the United States averages at least 800,000 days each week,[2] or approximately 40,000,000 days each year. That equals the work days required to produce over 3000 bombers. Last year, 18,000 persons were killed in occupational accidents, and more than 90,000 others suffered permanent disabilities. Together, these accidents account for the loss of approximately 4,000,000 workdays each week, the workdays necessary to build eight destroyers.[2] But the time losses in industry caused by non-occupational, off-duty accidents are far greater than all the losses due to occupational accidents and occupational diseases combined; in fact, they are more than twice as high.

Huge as these losses of vital man-hours sabotaged by accidents may appear to be, they account for only a small fraction of all the lost time in industry. Non-occupational diseases, all the ills of the body and of the mind and the emotions to which the human flesh fell heir, deprived industry last year of approximately 3,000,000,000 work-productive man-hours, or nearly 400,000,000 work-days. Some of the loss is, of course, unavoidable, some of it can be salvaged through better placement of the worker and by preventive medicine and cooperation from the private physician, and some of it, unquestionably, can be saved by stimulating greater loyalty to the job in this critical hour. If we could save even a tenth of this lost time due to sickness, the need for long hours of work and the seven-day week could be materially reduced, the vicious circle between fatigue and lost time broken, and production definitely increased.

These are the problems of industrial health— occupational diseases, off-duty accidents and non-occupational sickness. Industrial health and industrial efficiency go hand in hand. If industrial health breaks down, production will fail. If production fails, the boys who fell at Pearl Harbor, at Bataan and at Corregidor will have made the supreme sacrifice in vain.

To MAINTAIN industrial health at a productive level is the province of industrial medicine. Industrial medicine may therefore be regarded as the science that deals with prevention, alleviation and cure of diseases that affect gainfully employed persons.[3] It is a field of special medical interest comprising the practice of medical-department administration, medical supervision, preventive medicine, toxicology and public health within the confines of industry.[3] Its objectives[4] can be accomplished by the prevention of disease or injury in industry through the establishment of proper medical supervision over industrial materials, processes, environment and workers, by the health conservation of workers through physical supervision and education and by medical and surgical care to

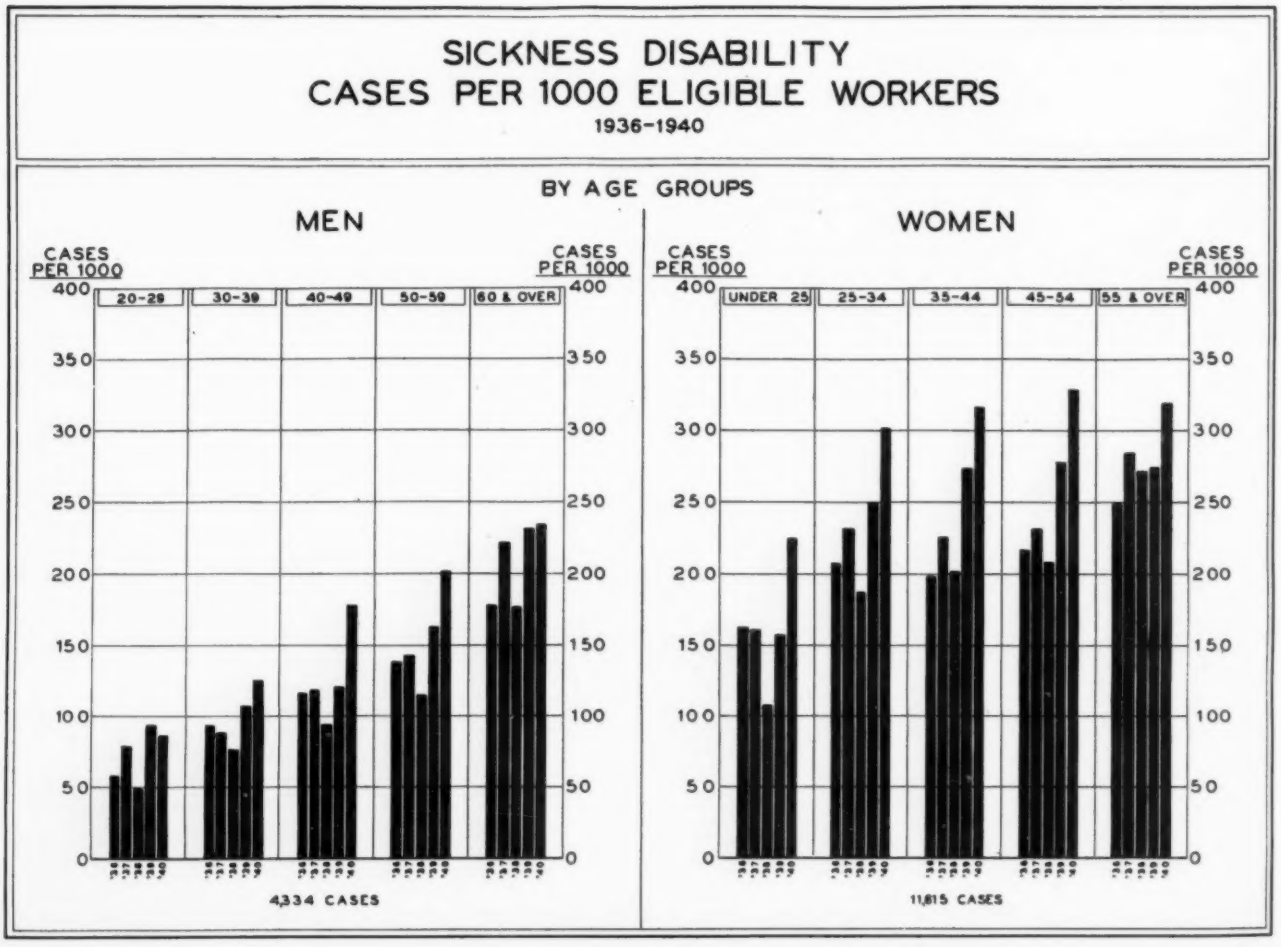

Fig. 6.

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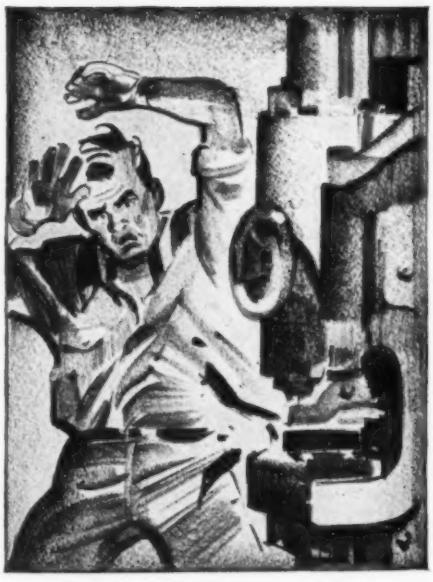

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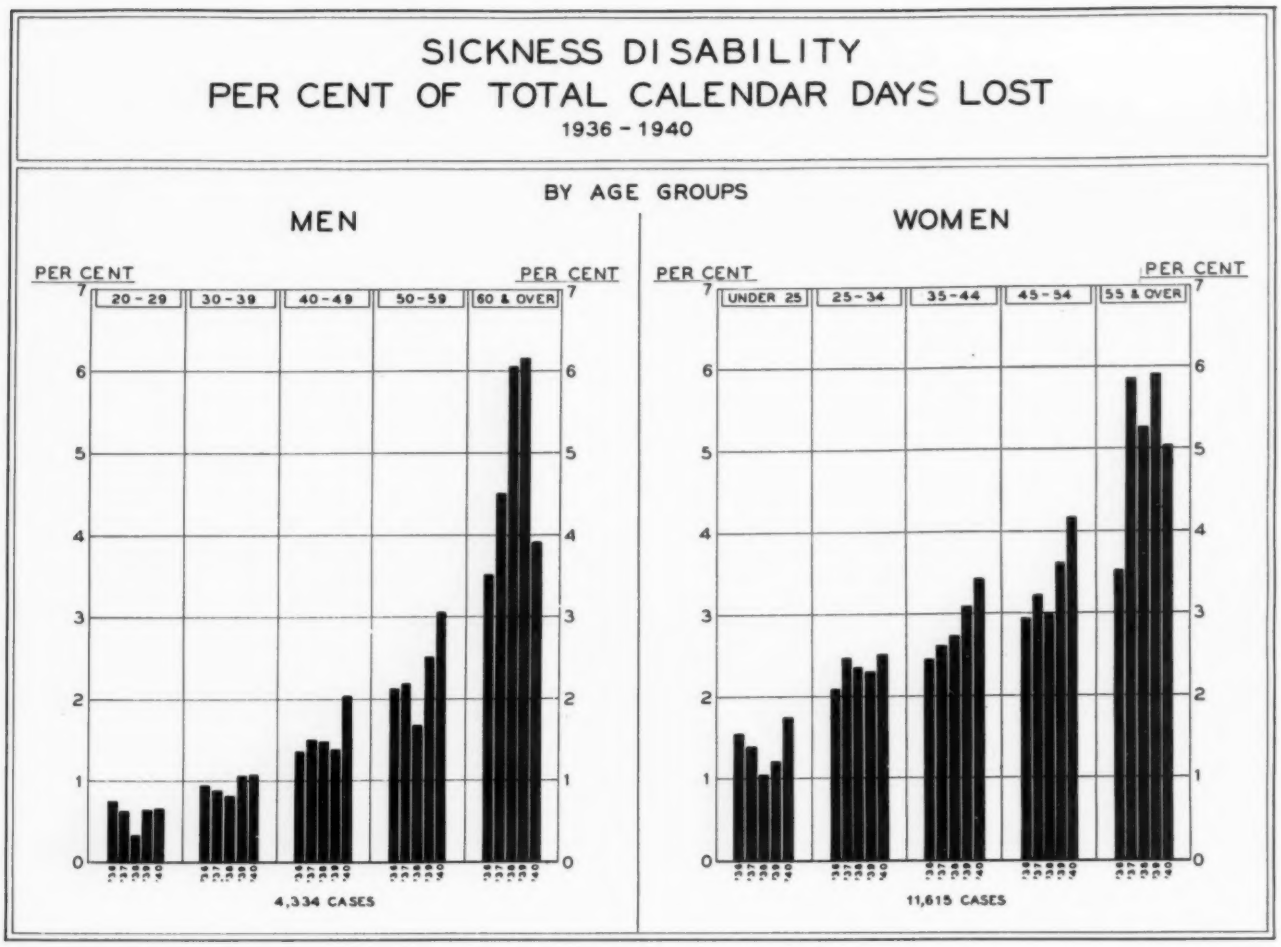

Fig. 7.

restore health and earning capacity as promptly as possible following industrial accident or disease.

No revolutionary changes in well-managed industrial health programs for peace are required to remodel them for production for war. Health measures that have long been recommended and used successfully in large industries should be applied with greater interest and renewed vigor and more extensively to include the small plants of 500 or less workers, where about 70% of all industrial workers are employed, and where there is good reason to believe that the individual worker is exposed to more hazards or to the same hazards in more ways than the man in the large plant, because their frequency and severity rates of accident are definitely higher.

The major health measures[1] may be enumerated as:

Prevention. The physician should acquaint himself, by regular inspections, with all materials and processes used in the working environment over which he has supervision, to the end that he may recommend appropriate protection of workers from conditions actually or potentially harmful.

Prevention requires provision for a safety organization with a definite and active program in accident prevention, which includes close supervision of the new inexperienced worker and the placing of the accident-prone worker in less dangerous jobs. All workers should be trained in first aid. (At the end of June, 1942, we shall have completed the training of nearly 8000 telephone workers in five New England states in the standard first-aid course of the American Red Cross.)

Industrial physical examinations. Preplacement physical examinations should be used to fit each person to a type of work that he is able to perform continuously without undue impairment, without injury to himself or to his fellow workers and with profit to himself and to his employer. Rejections should not exceed 3%.

Subsequent physical examinations should be complete enough to provide positive health protection for all workers and to safeguard public welfare. Repetition of such examinations should be governed by the circumstances of exposure and health.

Health education. The plant physician should take advantage of all opportunities for instruction of the workmen in hygienic living, both in and out of the industrial environment.

Medical and surgical care. In the treatment of compensable injuries and diseases, the disabled worker, after first-aid care, should be free to choose his physician from all those licensed doctors of medicine competent to supply the required services. The plant physician should cooperate to the end that no reasonable medical, surgical, hospital or consultative expense is spared to ensure a good end result.

The treatment of injuries or diseases not industrially induced is the function of private medical practice. In his industrial relations, the physician should abstain from such services except for minor ailments (the physician in industry may treat minor physical disorders that temporarily interefere with a worker's comfort or ability to complete a shift, and for the relief of which he may need immediate attention), first aid for urgent sickness (the physician in industry should employ such measures as the emergency dictates in all cases of urgent sickness occurring during working hours on working premises until such time as prompt notification of the family physician or family relieves him of responsibility) and rehabilitation after sickness and injury (the physician in industry can properly assume responsibility for those phases of rehabilitation after disability, industrially induced or otherwise, that progress best under controlled working conditions).

The physician in industry should be a specialist in his field. In addition to a good training and experience in the general practice of medicine and surgery and to good personal qualities, he should possess a knowledge of the detection and control of occupational diseases and be able to locate hazards and to study the earliest symptoms caused by them. He should become experienced in case finding in communicable disease and its control. He should possess

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a knowledge of administration, which includes industrial relations, because many of his problems are personal as well as medical. He should know job analysis, to assist in the proper placement of new workers and in the rehabilitation and proper placement of the injured, of the worker with arrested tuberculosis and of those handicapped by heart disease, hypertension, arthritis and other chronic diseases. He should have a knowledge of factory laws and records, of compensation laws, of plant sanitation, ventilation and illumination, of accident prevention and safety and of humanitarianism. He should have had special training quite beyond the field of private practice.

War production has placed special emphasis on the factors of fatigue and nutrition for industrial workers. It is known from Britain's experience[5] after Dunkirk that production, through the medium of the 12-hour day, seven-day week, increased for a short time, but that accidents increased two and a half times. Within two months production started to fall and absenteeism became general, owing in part to the fatigue or exhaustion of the workers. In 1941, a committee of the House of Commons reported that absenteeism, even during the winter, dropped about 35% when the working day was reduced to eight hours.

Fatigue, in its physiologic and its psychologic aspects, is perhaps the greatest problem facing the physician in industry today. More and more, it will sabotage the output of American industry unless we profit by the experience of our allies, who had to learn the lesson by trial and error.

If all of us, particularly private practitioners, who after all, will continue to treat nearly 85% of all disabilities, industrially induced or otherwise, will give serious thought, firstly, to the great need for production to win this war and, secondly, to the reduction of industrial lost time, the need for the seven-day week and the twelve-hour day can be materially reduced. For after all, we, as a people, "can't take it" any better than our British allies: unemployment, the short workday, the forty-hour week, the machine age, "Beauty-Rest" mattresses and other "take-it-easy" creature comforts have made "softies" out of too many of us. Perhaps, less automobiling and more footwork will make for less coronary-artery fat, disability and death, and for a stronger generation to follow.

Malnutrition is a fifth columnist that erodes our war-workers from within, and works on three eight-hour shifts to produce an industrial slow-down: insidious and unseen, it may well be an underlying cause of absenteeism, industrial accidents and lowered production. It has been clearly demonstrated that persons on deficient diets soon develop fatigue, mental depression, general weakness and loss of moral. Inadequate facilities for lunch and insufficient time for eating are, at the present time, justifiable causes for dissatisfaction among workers in many plants and on all shifts.

There is just a little more to wartime industrial health, as suggested by Dr. Elton Mayo, of the Harvard Business School. Industry must abandon the philosophy of "take care of the technical situation and let humanity handle itself." It must realize "that sentiment is perhaps more important than logic in dealing with workers; that the men at the bench have feelings other than those expressed in terms of hours and wages, that they need social recognition in the shop quite as much as they need it in the neighborhoods where they live." The maintenance of good mental health and of good morale is extremely vital to the industrial physician. He must continue his efforts to put humanitarianism into war-production activities.

May we, as private physicians and industrial physicians, team up so that production for war may be kept rolling, around the clock!

SOME of the problems of industrial health are illustrated by the accompanying charts, which are based on figures obtained by my department of the New England Telephone and Telegraph Company and from the Consolidated Edison Company, New York City.

Fig. 1 shows the distribution of industrial lost time between occupational and non-occupational accidents and non-occupational sickness. It should be noted that 86% of 16,648 disability cases were due to non-occupational

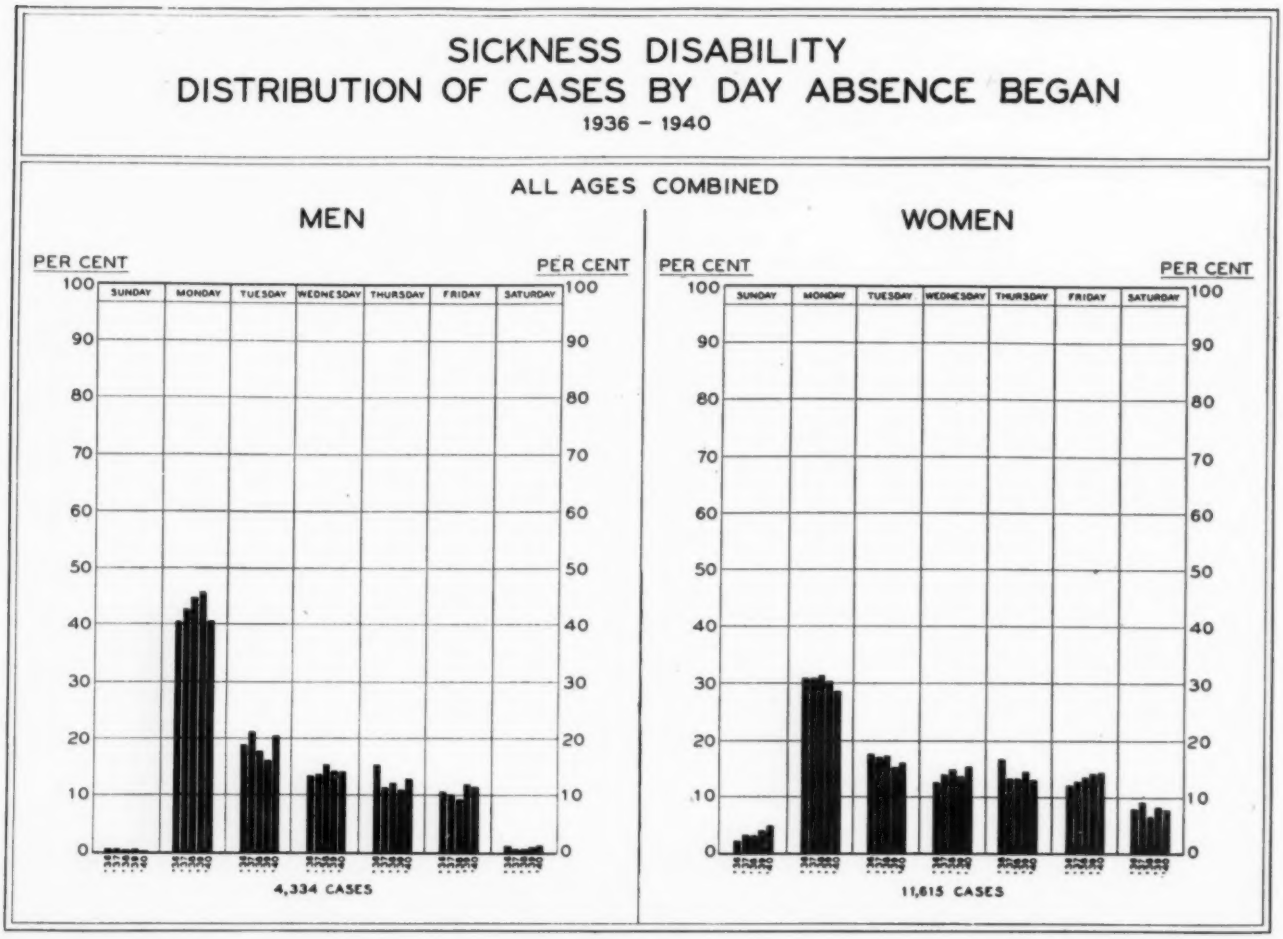
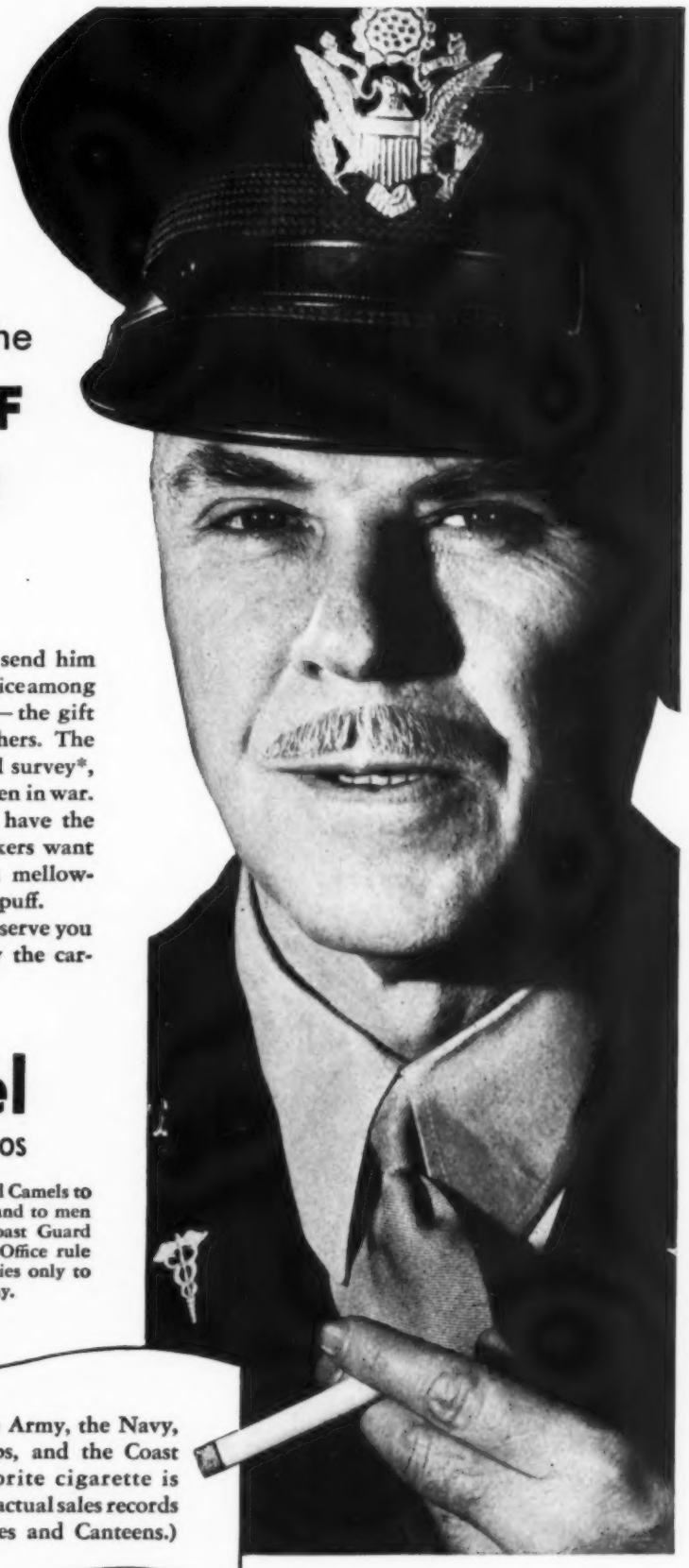


Fig. 8.



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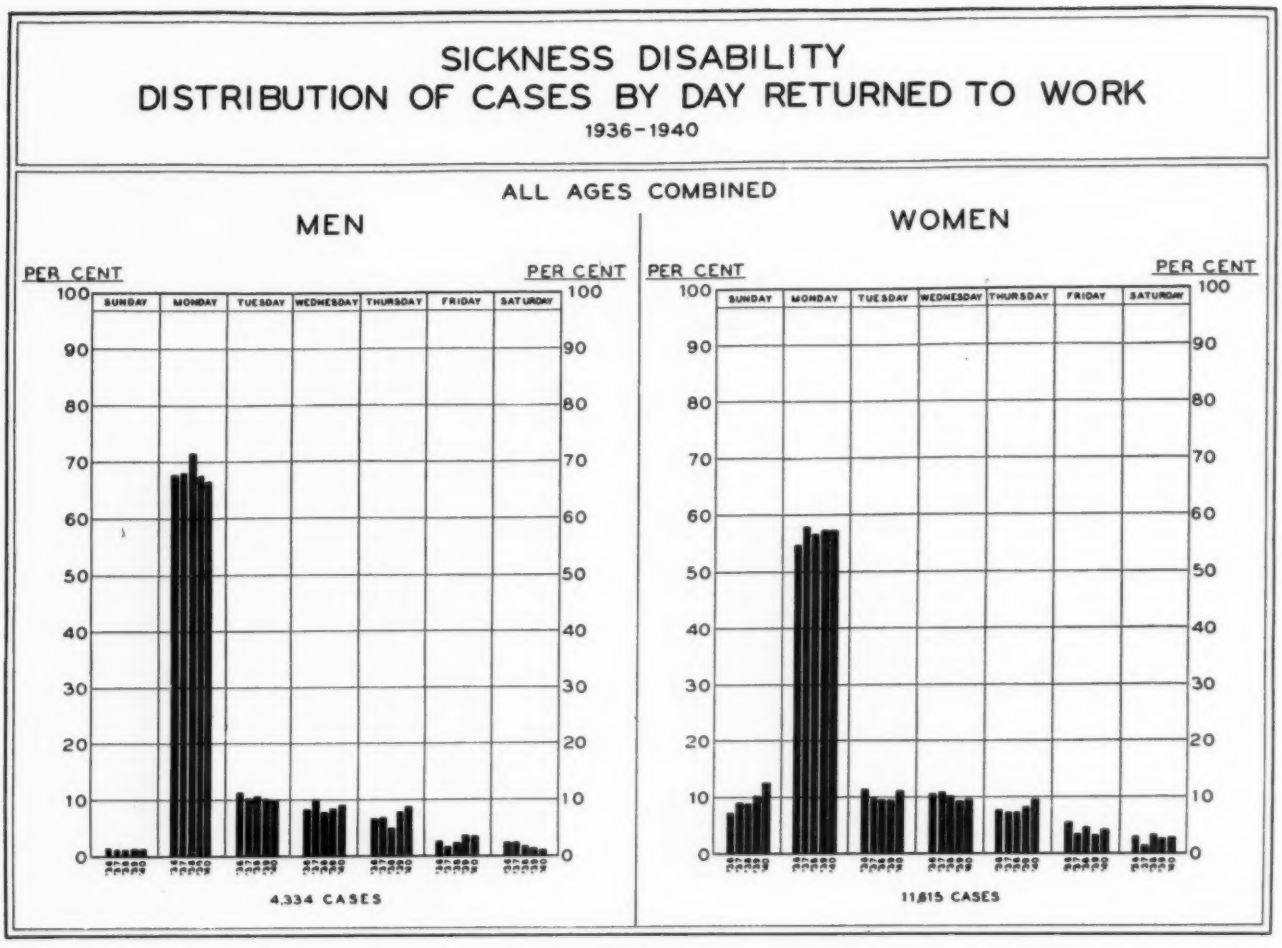

Fig. 9.

sickness that lasted eight days or more, 10% to non-occupational accidents and only 4% to occupational accidents causing disability for one day or more. Occupational accidents seem to have been well controlled.

Fig. 2 shows the frequency of medical diagnoses in illnesses lasting more than two days in a group of 19,500 cases. Upper respiratory infections were responsible for 48.5% of all these cases of disability, and all efforts to better the situation have thus far been futile.

Fig. 3 shows the severity of disabilities lasting two or more days in the same group; these layoffs accounted for approximately 155,800 lost days in 1941. Again, upper respiratory infection was responsible for a third of all lost time.

Fig. 4 shows the frequency of medical diagnoses among men and women when the absence continued for eight or more days. In both groups, disabilities due to upper respiratory infections caused the highest number of absences, as was true in the short-period absences. Disability due to off-duty accidents formed the second largest group among women, and the third largest group among men.

Fig. 5 shows the severity of the various types of disabilities. As one would expect, the proportion of all lost time because of upper respiratory infection was less among women and among men than the proportion of actual absences, since disability is shorter in upper respiratory illness. But it should again be noted that off-duty accidents among women caused nearly 11% of 300,000 lost days from work, and that, among men, they caused 7% of 173,000 lost days. In both groups, arthritis caused an appreciable amount of lost time.

Fig. 6 is evidence of the increasing frequency of disability for work among men and among women as age increases. In the age group from 20 to 29, there were roughly 70 cases of disability per 1000 men per year, whereas among men over 60, approximately 200 cases occurred per 1000 men. Among women, the contrast was not so great, but there is pictured the upward trend of disability frequency as women advance in age. This increase was consistent from year to year, and it emphasizes the problem of industrial health as it is affected by the older employees.

Fig. 7 demonstrates the severity of illness with increasing age; although men under 30 lost only about 0.7% of available work time because of illness, men over 60 lost nearly 5%. The situation was similar among women, the length of their absences increasing with age, regardless of its cause.

Fig. 8 is interesting. It shows the frequency with which absences began on the several days of the week. One wonders why such a large proportion of all disabilities began on Monday. It may be that workers did not feel quite up to par at the end of the week, but remained on to finish out the week; or it may mean that a good many of them had a "bad week end."

More interesting, however, is Fig. 9, which indicates the day of return to work following disability, regardless of the day on which disability began. Among men, nearly 70% returned to work on Monday, and the same thing was true for nearly 60% of the women. Production must continue on other days of the week, as well as on Monday, and those concerned with production cannot understand why workers who have recovered from illness wait until Monday to return to work. To a large extent, it is a psychologic problem—the thought of beginning the week right. Unquestionably, the private physician can help a great deal in this respect: a great deal of lost time can be regained if he will permit and encourage his patients to return to work as soon as they are able.

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INDUSTRIAL HEALTH and DISEASE

Reducing Absenteeism

MANY war plants and some war industry communities are carrying out excellent and effective programs to reduce job absences by striking at bad working and living conditions of workers. Particularly in the key shipbuilding industry, numerous efforts have been launched with considerable success to improve transportation, living and working conditions, and to develop systems of personal check-ups on absent workers.

Health and accident-prevention measures were emphasized in many programs as of primary importance in reducing the largest single cause of job absence.

East and West coast airframe industries have set up special programs through their regional councils, and the aircraft and parts manufacturers of the central states have just established the Central Aircraft Council to deal with absenteeism and other manpower problems affecting production.

The use of labor-management plant committees and union committees set up specially to investigate causes of absenteeism, and the placing of more responsibility upon foremen or "leadermen," are characteristic of the plant programs which have been successful in reducing absence rates.

Plants and shipyards with the best records of reducing time lost through job absence have installed accurate and complete systems of recording both absences and reasons for absences. With this basic data available from week to week, intelligent remedial action can be taken by management, labor, and labor-management committees with the support of communities and governmental agencies.

At the community level, joint action by management, union, labor-management committees, local officials, and business and civic organizations—all or some of them—has marked some programs which should serve as pilots for other war and essential industry areas. Federal agencies have been active in stimulating and developing the programs.

The OWI noted that experience shows many common points among the programs, although each plant and community has its own unique problems and difficulties—and that remedial efforts must originate with and be carried out by the workers themselves and the managements if they are to effect a permanent improvement.

The reports of industry and community programs paralleled closely the findings of various governmental war agencies as to causes and cures of the lost-time problem. It was also noted that the causes of absence from the job were found by the industrial reports to be broad and social in nature, calling for varied programs to improve living and working conditions created by wartime difficulties and adjustments, new jobs and new workers.

Furthermore, the reports showed that continuing efforts must be carried on "for the duration" because of the rapid expansion and replacement of workers, the increasingly difficult housing and transportation problems, and recurrent migrations of workers caused by changes in war weapons, shortages of materials and manpower, and layoffs.

Bridgeport, Connecticut, is an outstanding example of a community that has tackled this problem. This city, normally with 29,000 industrial workers, now has nearly three times that many. The city's chamber of commerce employed an out-of-town industrial engineer to make an objective survey of transportation and then called into conference leaders of labor, management, city and Federal officials, transportation companies, school leaders, merchants, and professional men. As a result, changes were made in some industrial working hours, in office hours, store, school, and shopping hours to make community services available to workers without losing time from their jobs.

Labor-management committees in 13 major Bridgeport war plants carried on active programs. In a typical company, the management keeps a complete record of absences, and repeater absentees are required to report to the labor-management committee. The employees make their own posters and put them up throughout the factory. One such poster signed by the labor-management committee, says "THIS IS WAR—AN ABSENTEE IS A DESERTER." In this company, absences were reduced about one-third in six months after the absenteeism committee was established. The committee has arranged for rationing to be handled in the factory to save workers' time. The company gives recognition to labor through banquets, mass meetings and plant publications.

The West Coast Aircraft War Production Council has published one of the most complete reports on the whole problem, emphasizing the necessity of preventing the causes of job absences which in January lost 3,000,000 man-hours in the eight southern California plants. This showed that absenteeism has not retarded plane production in the past but that it could be serious in 1943 if enough materials are on hand to meet increased production schedules.

Absenteeism in these plants averaged more than 7% late in 1942, 6.2% in January, and dropped further in several plants in February. In one plant, the rate dropped from 6.1% to 4.3%; in another, from 4.1 to 3.5%.

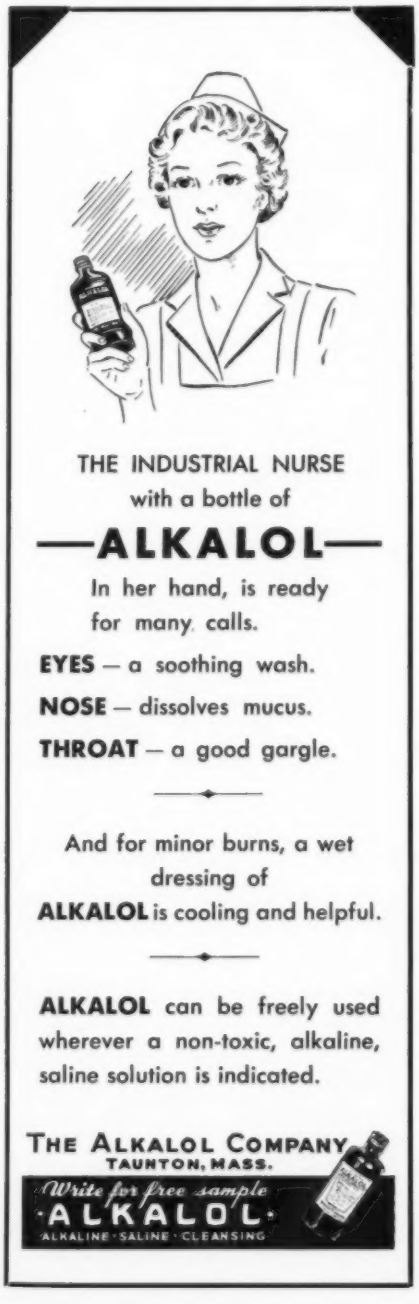
Women generally were shown to have higher absence rates than men, which is attributable to the fact that they include a higher percentage of the new and inexperienced workers, and to their home and family duties.

The Council, after analyzing the causes of job absences, proposed "step by step elimination or modification of basic causes" through coordinated industry activity and individual company programs.

The plant programs vary considerably. One program, which was credited with aiding in a 30% drop in job absences in a single month, permits all employees with a perfect four-week attendance record to participate in a monthly prize drawing for 73 prizes, the largest of which is $1,000, and aggregating $10,000.

One big plant has a rule requiring a worker who has been absent three consecutive days to report in writing the reason, the dates, and whether a doctor was in attendance, and, if the reasons appear unreasonable, the worker is interviewed by a member of the absence control department. In addition, a "visual reprimand" is mailed to all unreported Saturday and Monday absentees. This company also uses posters to show the number ab-

Office of War Information Release, March 26.



sent in each department on each day.

Another company, on the second day of unreported absence, sends a telegram to the absentee appealing to his patriotism and asking him to telephone the company stating his reason for absence. This telegram is signed by the worker's foreman. On the fifth day of unreported absence, the employee is sent a registered letter saying an immediate report must be made or employment will be terminated, under an agreement made with the workers through their union. Visiting nurses are employed to call on persons absent for illness or injury more than three days. Another company, with a similar program, has established 10 days of unauthorized absence as cause for discharge.

A fifth company has set up an intensive poster and chart system showing the number absent each day, the result of the absences, and the results possible with full attendance.

Uniformed members of the plant protection force are sent to interview absentees after three days out in another plant, which sends visiting nurses to call on those who are reported ill.

A seventh company, in addition to charts tagged "Holidays for Hitler" and similar slogans, is conducting plant studies on ventilating systems that do not work properly to eliminate causes of colds and other illnesses.

The airframe company with the lowest absence rate—3.2% for men and 5.2% for women, gives all new employees a two-hour induction tour, including a 15-minute talk by the safety engineer. The operations of the entire plant, and the worker's own part, are carefully explained. Absent employees are required to report within three days or their employment automatically terminates. Phone calls or telegrams are used to contact absentees. Time required to fill out absence reports and visit the medical department is deducted from pay. Hospitalized employees are sent greeting cards by the company.

Possible steps now being studied by the industry include changing payday from Friday to Saturday to prevent Saturday absenteeism; rearrangement of the work-week to permit workers to attend to their personal affairs on weekdays; part-time shifts; vacations as a reward for perfect attendance.

Stimulation of worker morale through campaigns, the Council warns, "may be wasted effort if basic causes of absenteeism are not controlled."

Many useful patterns of local and plant action were outlined in examples reported upon by the War Manpower Commission, WPB's Labor Production Division, and other agencies.

Job absences caused by workers shopping for new jobs have been importantly reduced in some communities when voluntary employment stabilization and hiring-control programs have been worked out by management and labor. In Louisville, for example, the separation rate in one group of war industries dropped from 12% to 7% a month after the stabilization program went into effect. The improved absenteeism picture in Louisville is attributable in part to community rallies, visits by war heroes, and the improved and realistic gearing of store hours and transportation to the needs of the workers.

Lack of adequate housing is a principal cause of time lost from work in many war communities. Acting on field reports from the western copper mining and smelting areas, WMC headquarters in Washington arranged with WPB and National Housing Agency officials to go into these communities and arrange, right on the spot, for the construction of new housing. Employers in Texas and New Mexico reported that their absenteeism rate, which ran from 25 to 30% prior to last September, has been reduced to between 8 and 10%—which is still too high. One mining concern has reported a production increase, from 65% of capacity September 7, to 100% at present, following such action.

In Portland, Oregon, the Area Manpower Committee took action to improve and expand laundry service, reducing one primary absenteeism factor. Arrangements were made for more adequate restaurant service for war workers. Similar action has been made under WMC leadership in other communities.

The Labor Department reports transportation difficulties are a major factor in many huge war plants which have been built in outlying areas and drawing their labor supply from great distances. One firm attributed 31.7% of its absenteeism over a six-week period to transportation difficulties. One company, in meeting this problem, set up a transportation coordinator to arrange car-pools and take care of gasoline, tire, and automobile repair problems for its workers. One shipbuilding company renovated 42 railroad cars, purchased from a defunct company, to carry workers 15 miles from a city to its plant. Other firms have purchased and operate busses for workers where other transportation is inadequate.

Unavailability of recreation and other services to workers on the "graveyard" (midnight to morning) shift was found to be causing unnecessary job absences. In some war communities, arrangements were made to provide facilities for cashing paychecks in the evening and lengthening the operating hours of movie theaters, bowling alleys, and other places of recreation.

In a Florida ordnance plant, time losses on the graveyard shift led WMC officials to recommend transfer of women workers to vacancies in earlier shifts. This helped in a material decrease in over-all job absences.

In Buffalo, WMC promoted a rerouting and re-scheduling of bus service to ease one of the major factors in absenteeism. One Buffalo company has all absentees interviewed by members of the plant's labor-management committee, and absences have been reduced from 15% to 3%. The committee members explain the importance of staying on the job and point out how lost work hurts the whole war effort. Illnesses are checked by visits to the workers' homes. In another company the labor-management committee interviews all new workers to deliver a similar message. A third company leaves such interviewing to the union and reports that absenteeism has not been a factor in limiting production since the union's absenteeism committee began to function.

Reports to WPB from other war industry centers similarly tell of excellent results from labor-management plant committees. Such a committee in a Knoxville war plant reported absenteeism reduced from 4.5% to 1.25%, through efforts to show the workers their importance to the war. One Cleveland, Ohio, firm reports absences down from 5.7% to 1.9% through the work of its labor-management committee whose members visit absentees at home and interview them when they return to work. The committee also worked on removing some of the causes for avoidable or excusable absence from work. In another Cleveland plant, a labor-management committee, largely working through informal personal interviews, cut the absence rate from 4.4% last April, when it started its work on this problem, to 2.3% last December. A third Cleveland plant's policy is to let its union's absenteeism committee interview all offenders, and absenteeism has been held down to 3.11% in the entire factory.

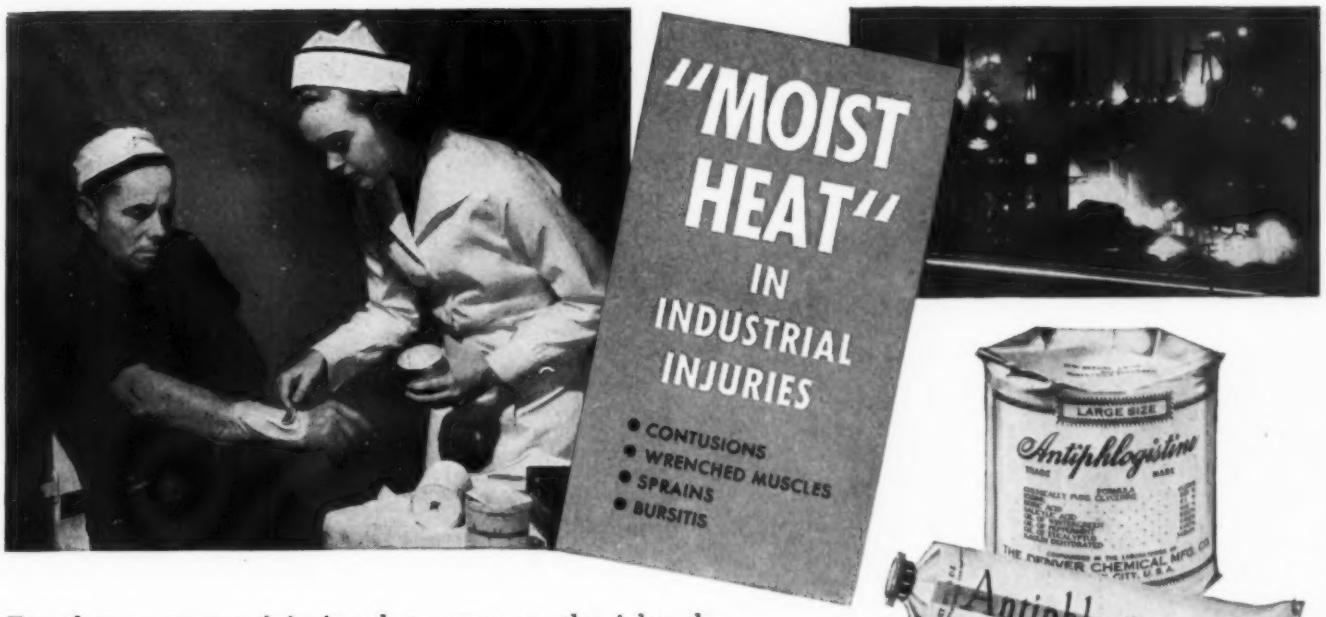
Maritime Commission officials report that most of the 70 shipyards with maritime contracts have programs in effect which are built around the principle of making the leadermen responsible for the 10 to 20 men who work under him. The absences are first checked individually by the leadermen in friendly discussion with the absentee. Conferences are held with these foremen in each department or yard in which the reasons for absences are analyzed and conditions and difficulties of the workers are thoroughly explored.

In one Southern shipyard, such a conference brought typical reasons for job absence and methods of improving conditions within the yard. The difficulties presented and the solutions that were applied were:

"Too much favoritism." Unnecessary transfers of men were discouraged; supervisors were warned to "lay off politics" and told they must give full justification of job changes.

"Workers are making more money than ever before and can afford to lay off. Some men will drink and lay off after pay-day." The leadermen, who are themselves workers and most frequently belong to the same union as the men under them, were put under obligation to follow through on "repeaters." Production quotas were established, and workers were challenged to meet them.

"Men quit to take other jobs." Applications for releases were checked more carefully, and a "quit inter-



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viewer" was employed to explore all releases and to talk with men who wanted to leave. Frequently these interviews uncovered remediable grievances, adjustment of which not only resulted in the retention of the men interviewed but also produced a general adjustment removing such a cause of quitting for others similarly situated.

Another similar conference in the same plant brought out these additional reasons for job absences:

"Lack of interest on the part of the men." More publicity was given to the number of man-hours lost, and posters and slogans were put on cranes, trucks, and other equipment in the plant, emphasizing the importance of this work to the successful waging of the war.

"Lack of transportation." Representations were made to the rationing board to obtain gasoline and tires for workers. Bus schedules were checked over, and a share-the-ride plan was started.

In a Texas plant, the following came out in a leadermen conference:

"Men find job monotonous." Better placement of workers on jobs suited to them was proposed, and leadermen were instructed to keep in closer touch with the men under them.

"Men not working on Sundays stay home on week-days for business, dentist, ration board, etc." It was decided to rotate days off so that men would get week-days off sometimes, and also to seek community cooperation to stagger hours of ration boards, stores, and professional offices to provide service for war workers after or before shift hours.

"Men receive no recognition for continuous job attendance." It was decided to publish the names of those having 100% attendance and to issue buttons or badges to such workers.

"Men not used to this climate stay away because of sore throats, etc." Treatment provided at company hospital.

Arc Welding and Sterility

THE Division of Industrial Hygiene of the National Institute of Health has had several requests for information on the effect of radiation from arc welding on female reproductive organs.

Sterility resulting from exposure to the radiations from arc welding is extremely improbable, and certainly would not be produced without causing other serious systemic disturbances. Impotence of a temporary nature has occasionally been associated with welding operations, but functional impotence is distinctly related to the individual, and the fundamental causative factors are emotional and psychologic. In the absence of demostrable organic disease, impotence is best treated by psychiatrists.

The part of the ultra-violet spectrum which is emitted by welding arcs and which is known to have biological effects has the characteristic of very low penetrating power. A layer of skin only a fraction of a millimeter thick and a layer of clothing of the usual nature will absorb practically all of the ultra-violet radiation. Infra-red radiation emitted by the welding arc may penetrate somewhat more deeply than the ultra-violet rays. However, before the infra-red could produce any striking biological effect, a definite sensation of burning would be noted and the effect of the burning would become quite uncomfortable.

Impotence has never been known to arise as the sole and exclusive manifestation of any occupational disease, with the possible exception of damage from roentgen rays (x-rays). Experiments have been conducted in industrial plants to determine whether x-rays are emitted by the welding arc. The results of several weeks' exposure of dental films carried in the pockets of welders failed to indicate even the slightest amount of x-ray exposure.

There is the possibility, however, that persons exposed to arc welding radiation may also develop intoxication from metal fumes and other substances, which may result in diminution or even temporary disappearance of sexual capacity, but not one of the chief potential exposures—ultra-violet rays, ozone, oxides of nitrogen, metal fumes or heat—is known to be capable of producing sexual impotence as the sole manifestation.

The fact that nitrogen compounds may be produced in arc welding may be the basis for the rumor that sexual

From *Industrial Hygiene—Current News of Official Industrial Hygiene Activities*, March, 1943.

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impotence is produced, since it is an old tradition that some inorganic nitrogen compounds constitute sexual sedatives. There exists scant evidence, if any, that the nitrogen compounds produced in welding will exert any direct or primary action other than on the respiratory tract.

While it is true that any debilitating occupational disease such as lead or manganese poisoning may cause sexual capacity to diminish or temporarily disappear, the same would be true in non-occupational diseases such as typhoid or pneumonia. While one action of lead in human beings, and in the lower animals, is to damage sexual tissue and to promote sterility, abortions, and miscarriages, it is believed that this will not arise in the absence of other and more characteristic features of lead poisoning.

In summary, it would appear extremely unlikely for arc welding radiations to have a deleterious effect on reproductive organs. It is possible, however, that if welding fumes are not properly controlled, intoxications incidental to the welding process infrequently may cause untoward effects.

Causes of Absenteeism

IT IS impossible from the data now available to determine with exactness the amount of absenteeism in industry that is avoidable. According to the chairman of a British coal company absenteeism is largely a question of health. He stated that a large number of shifts were lost from absenteeism due to rheumatism and his company employed a well-known authority on this disease to investigate its incidence among the miners employed in the company's collieries and to determine the physical fitness of all the employees. A "White Paper on Coal" is quoted in a recent issue of the *Colliery Guardian* as suggesting that there are many men in the mining industry who are not actually ill but who are in need of medical treatment to keep them at work.

The tendency is to blame absenteeism on the worker, that is, the worker is absent owing to illness, to injury from accidents, or to some other personal reason. Many cases of illness and probably of injuries from accidents, however, can be traced to conditions prevailing in the working environment. When some of the employees in one section of an industrial establishment have more sickness absenteeism than those in another section the source should be sought in the working place, not in the employees. This applies also to employees of one establishment compared with those of another, Two similar plants may be operating side by side, one having a high rate of sickness absenteeism and the other a low rate. The absenteeism in the plant with the high rate is avoidable if the conditions causing the illness can be corrected. This illustrates the difficulty of determining when absenteeism is avoidable and when it is not avoidable.

According to the Secretary of Mines for Pennsylvania, the results of a survey of more than 65% of the miners in the hard- and soft-coal fields of that state disclosed that minor absenteeism resulted in a loss of more than half a million tons of production during June, 1942. More than half of this absenteeism was voluntary. The survey revealed that 135,929 man-days lost during the period mentioned caused a loss of 611,806 tons in production. An analysis of these figures shows that 68,867 of the lost man-days and 366,993 tons of the lost production were avoidable. In the anthracite industry alone 63,678 man-days lost during June resulted in a production loss of 178,298 tons, more than 58% of which was avoidable. As causes of absence illness ranked first, with a loss of 11,132 man-days (17.48% of the total); mine water from floods second, with a loss of 10,528 man-days (16.53% of the total); mine injuries third, with 3,727 of the lost days; and "labor trouble" fourth, with 3,539 lost days.

In Great Britain, where many miners have volunteered or have been drafted into the armed forces or have left the pits for the munitions plants where wages are higher and working conditions less strenuous, the serious reduction in force has led to punishment by fines and imprisonment of miners who are absent from work without good excuse. Sickness or

From "Absenteeism in the Coal-Mining Industry," by R. R. Sayers, M.D., published in "More Manpower Through Reduction of Absences," by Industrial Hygiene Foundation.

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fatigue is given more frequently as an excuse for such absenteeism than in the United States, where conditions have not been so serious. To be excused for sickness absenteeism in Great Britain a miner must have a certificate from a physician; otherwise he may be prosecuted. Many of the men arrested have complained that they had rheumatism or some condition for which it was not customary to obtain a certificate, or that they were too tired to work continuously week in and week out without taking a day off now and then. A man writing to the *Colliery Guardian* in 1941 regarding "manpower and output" stated:

With regard to absenteeism this is not so bad as the figures suggest, if by absenteeism is meant idle holidays. A miner works harder than most men. The end of every shift finds him exhausted. Ride in a miners' bus and see the men fall asleep almost as soon as they sit down—you will see how tired they are. Many of the lost shifts are due to downright tiredness. Another thing to remember is this—a miner receives more knocks than the average worker; little things, but sufficient to make working in a pit positive torture. Often these are not reported. On the other hand there is a small proportion of men who holiday from sheer idleness — these the companies have power to deal with and should do so. In conclusion may I suggest that there are other causes of lost output, that have nothing to do with the men. It might be profitable, to examine them sometime.

The following report of a case in the *Iron and Coal Trades Review* for February, 1942, illustrates the type of absenteeism prevalent among British miners. A ripper, 44 years old, was charged with having failed to comply with a direction of the National Service Officer to report at 11 P.M. for the Sunday night shift. The prosecutor said the defendant had been absent repeatedly from work on Sunday nights and his conduct was reported to the pit production committee. When he was interviewed he said his job was heavy and he couldn't keep up six days at the hours he was putting in. He made no appeal, as was provided for, against the direction and no excuse of sickness. It was said in his behalf that he had worked overtime during the week and when Sunday was reached he had not felt fit to go down. He had been a colliery worker for 30 years and said his work was heavier than coal-getting and that it had been as much as he could do to put in the time he had, including overtime three days a week. He had caused no loss of production through his absences and there was no question of patriotism in his attitude. He said he was willing to pull every ounce of which he was physically capable but felt that without the occasional rest he might be off longer with illness. Two fellow rippers confirmed the defendant's story and said he was one of the best workers in the pit. The magistrate, however, found the case proved, and the defendant was fined a total of £5.

British miners claim that the extent of avoidable absenteeism has been exaggerated and contend that among the contributory causes of failure of production to expand have been faulty management; industrial friction; scarcity of materials for repairs and replacements; the food rationing system; occasional inadequacy of transportation facilities for the conveyance of miners to the pits; periodical stoppages through lack of wagons; the drain on individual stamina of firewatching and Home Guard services; and employment of the less fit to obtain the necessary manpower.

The main causes listed by the British authorities for absenteeism are inadequate eating arrangements for long shifts; bad transportation facilities on weekends; widespread objection to Sunday work; and reduced incentive as a result of rationing and declining supplies of consumer goods in the face of mounting earnings. Another reason given is resentment at paying income tax and at the higher wages paid in other industries.

In regard to food rationing, it was pointed out recently that a miner usually consumes as much meat in two days as the present ration allows him for a week. Men doing heavy mine work have felt keenly the rationing of staple foods such as bacon, cheese, and beef. It is customary for them to eat one meal underground. Their food is brought from home and includes rationed products while factory employees usually obtain a meal a day at a canteen without the use of ration cards.

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The resentment at paying income tax is manifested by the inclination of the men to stay away rather than work a day or more for "nothing," as they put it. In certain districts in Great Britain where new factories are coming into production the wives and daughters of the miners are now being employed more extensively and sometimes earn more than the miners. A sense of injury is aroused because the earnings of husband and wife are combined for income tax assessment. Frequent rumors in the daily press and elsewhere of waste, idling, and extravagantly high wages in other industries further unsettle the miner. In one instance 232 haulage workers went on a strike because many of them had sisters working in government factories who were reported to be earning twice as much as their brothers.

Reasons for miner absenteeism in the United States do not seem to be as cogent as some of those given by the British miners.

COMMENT and OPINION

—Continued from page 50.

WITHOUT adequate medical services to workers and without medical control of various operations, absenteeism due to illness would increase to alarming proportions. Without medical control, absenteeism would increase because of the increased number of hours worked; the inexperienced help used; the changed composition of our labor force, for women and physically handicapped are replacing our young workers; and the introduction of new chemicals in the manufacturing process.

—From an editorial, "Indiana's Industrial Health Conference," in *J. Indiana State Med. A.*, April, 1943.

NATIONAL Industrial Conference Board's management research division reports that absenteeism in 1942 resulted in the loss of nearly 423 million man days in U. S. industry—an increase of 72 million man days. The report says that in order to compensate for this loss of time it was necessary for industry to maintain on the payroll 1,350,000 extra employees.

THE MIND OF THE INJURED MAN

A Study of Trauma and the Nervous System, with Particular Reference to Neuroses Associated with Injury

by

Joseph L. Fetterman, M.A., M.D.,
Assistant Clinical Professor of Nervous Diseases, Western Reserve University School of Medicine, Cleveland, Ohio

Foreword by Foster Kennedy

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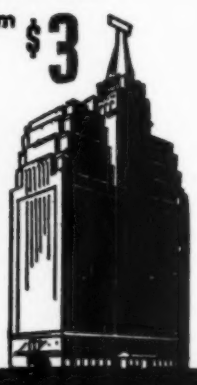

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INDUSTRIAL HYGIENE SECTION

This Industrial Hygiene Section is published to promote sound thought upon and concerning industrial hygiene. To that end it will contain articles, discussions, news items, reports, digests, and other presentations, together with editorial comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The Editorial Committee will exercise its best judgment in selecting for publication the material which presents most exactly the factors affecting industrial health and developments for control of potentially injurious exposures. The editors may not concur in opinions expressed by the authors but will endeavor to assure authenticity of fact.

The Science, the Law and the Economics of Industrial Health

Volume 4 | April, 1943 | Section 2

Our Annual Meeting

THE Fifth Annual Meeting of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION is to be held in Rochester, New York, on May 25 and 26 in connection with the NATIONAL CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS on May 24 and the meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS extending to May 27, 1943. These meetings include a broad program, touching on many phases of industrial hygiene and containing many items of pertinent interest in the present emergency. Copies of the program will be distributed shortly.

These annual meetings serve not only to bring before the Association the results of many of the important current investigations but also present an excellent opportunity for interchange of ideas. Although the program is admittedly broad, it obviously was not possible to cover all phases of industrial hygiene, and possibly some problem that you are intensely interested in at the moment is not mentioned in the program, such, for example, as the chronic toxicity of 3 methyl —2 amino—8 anilino —10 tolyl phenazonium chloride. We do not know the answer, but we feel certain that among those attending the meeting there will be someone who can give an authoritative report. These "Corridor Conferences" are one of the more important parts of the meeting, and the informal or unwritten program will undoubtedly cover a range of subjects far greater than that of the formal program. The "board of experts" will be almost unlimited in number and experience. Here will be an opportunity to get the answers to those questions that have been bothering you—but come prepared to answer questions, because you may be on the "giving" as well as the "receiving" end.

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OFFICIAL Publication of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, PHILIP DRINKER, Boston, President; H. H. SCHRENK, Pittsburgh, President-Elect; EDGAR C. BARNES, East Pittsburgh, Secretary; THEODORE F. HATCH, Philadelphia, Treasurer.

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Foresighted versus Benighted

IN THE good old days it was the usual practice to carry on operations with attention to turning out the finished product without thought of the possible health hazards which might be introduced. If materials or processes were going to cause occupational disease, these would come to light soon enough and precautionary measures could then be taken. Where occupational diseases actually did occur, the symptoms were ascribed in a number of cases to non-occupational causes until the true cause of the condition was too self-evident to be denied.

Today we are glad to record another of the increasing number of instances where industry is being foresighted instead of benighted in the handling of potential health hazards. In the rapidly expanding synthetic rubber industry with the attendant manufacture of military rubber goods combining both natural and synthetic rubbers, industry has given attention not only to production but also to measures for protecting the workers' health as well. As is detailed in the article in these pages, both medical and engineering research have been conducted and the findings given practical application to the end that men and women who are becoming skilled in the preparation of these vital products will continue to remain on the job to give their best efforts for the country.

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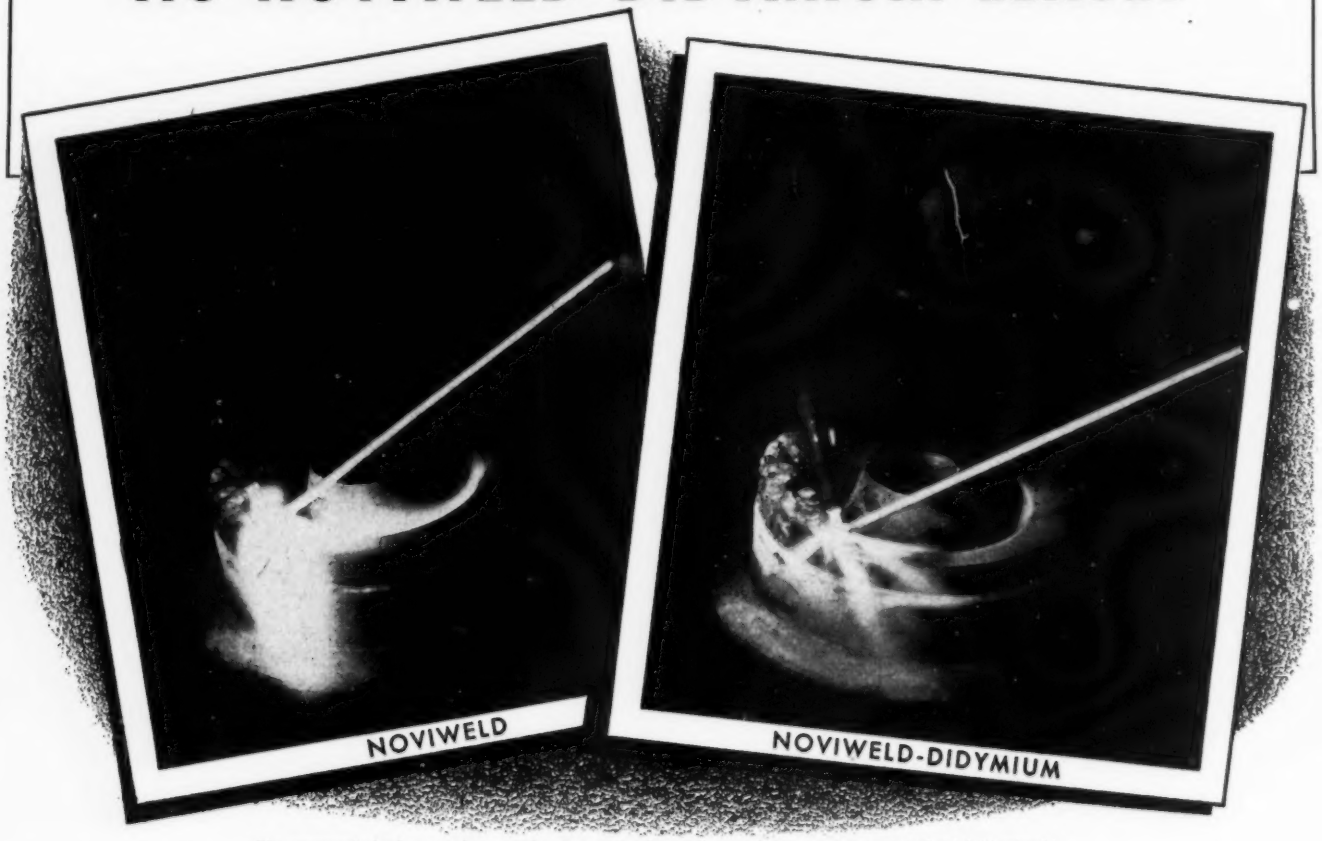

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It would be considered inexcusable military tactics to send a detachment across terrain controlled by enemy machine guns when a well-placed shell or bomb might first be used to wipe out the machine gun nest. It is just as poor tactics for an industry to place a detachment of workers in a manufacturing operation without first assuring that disabling health hazards have been placed under control. With the extension of information concerning the methods of industrial hygiene and the increasing realization that maximum war production can be obtained only with maintenance of the health of workers at high levels, we can expect a more universal adoption of the policy of being foresighted instead of benighted in the provision of proper hygienic measures.

Control of Solvent Exposures

—In the Rubber Industry—

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SOLVENTS, both toxic and relatively innocuous, have assumed a major position in the hygiene problems of the rubber fabrication industry. Benzol and its homologues, as well as the chlorinated solvents, carbon tetrachloride and ethylene dichloride, are necessary solvents for the greatly increased amount of synthetic rubber now in use, since petroleum naphtha will not adequately dissolve these materials.[1] War production of important military equipment has increased greatly the number of persons handling the solvents, including many women recently brought into the factories.

Following a conference on May 29, 1942, concerning health hazards in the rubber industry, the Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, Bethesda, Maryland, undertook this study of the control of potential exposure to solvent vapors. The original health conference was inspired by several disabilities and deaths from inhalation of benzol. Solvents in question besides those mentioned above were carbon disulfide, petroleum naphthas, and ketones. It was felt that some information was desirable on control measures at operations where the less toxic solvents are now used, since synthetic rubber may later replace the natural product and require more toxic materials.

Although the production of synthetic rubber does not require organic solvents, one of its raw materials, acrylonitrile, has been found to be a severe poison[2, 8] so its use was investigated in connection with this study. A broader study of the use of benzol and other solvents in industry is being carried on and will be reported later.

SCOPE—After a reconnaisance survey in four fabricating plants, the following types of manufacture were found to be these in which solvent hazards existed, either actually or potentially, for a large number of persons:

1. Fabric coating.
2. Balloon fabrication.
3. Airplane fuel tank fabrication.
4. Rubber boat and pontoon fabrication.
5. Synthetic rubber production.

These five types of work were then studied in detail by analyzing the manufacturing procedures, obtaining air samples where possible for quantitation of existing exposures, reviewing the proposed or existing control measures, and measuring the air flow of ventilating systems. Although complete information was not available in all the above categories, the collected data are included in this report. Observations of typical control measures are outlined, and those installations which appeared to be particularly effective are presented in detail.

USE OF SOLVENTS—Procedures briefly outlined in the following paragraphs are explained more fully in the subsequent text. Fabric was coated with natural or synthetic rubber by spreading a thin layer of the material, suspended in a suitable solvent, onto moving cloth from behind a spreader blade. The vehicle was then evaporated from the fabric by heat, leaving the rubber impregnated in and on the surface of the cloth. Gas-containing cells such as balloons, rubber boats, and pontoons were then fabricated from this material by cementing together sections of the fabric previously cut to pattern. For this work, a cement consisting of rubber dispersed in a suitable medium was used. Finally a rubber reinforcing tape was cemented over the seam. In addition to the cement vehicle, organic solvents were used for washing dirt from the fabric and for softening some surfaces in preparation for cementing (tackifying).

Motor fuel tanks were fabricated by cementing together over a form several layers of sheet rubber or heavily impregnated fabric. Solvents were used as vehicles in the rubber cements as well as for washes and tackifiers. These adhesives were used to cement together the various layers, to make the necessary seams, and to insert edge reinforcements and such appurtenances as hose connections and clean-out ports.

Synthetic rubber of the Buna N type is a copolymer of butadiene and acrylonitrile. While no organic solvents are required for this production, the acrylonitrile is a serious potential hazard, and its safe handling will be considered.

METHODS—For determination of vapor concentrations of the coal tar solvents and of toluene-petroleum mixtures, such as those from processed petroleum trade-name solvents, two methods were used: the Mine Safety Appliances Company benzol indicator, and the spectrographic method developed in this Institute.[3] The second technique was used to check the indicator, which proved to be sufficiently accurate for both benzol and toluol. Atmospheric concentrations of petroleum naphthas and of ketones were not determined.

The chlorinated solvents, ethylene dichloride and carbon tetrachloride, were sampled by two methods to obtain some data on the correlation of a new method being developed in this Institute with one of proved efficiency. The latter was the method of Elkins,[4] using amyl acetate as an absorbing medium. In comparable samples, agreement between the two methods was good.

Carbon disulfide was determined in one location by bottle absorption in the triethanolamine-copper acetate reagent suggested by Viles[5] and modified by McKee.[6] Since no adequate method existed for determination of acrylonitrile, no samples of this vapor were taken. Other laboratories are now working on this determination.

Determinations of air flow were made with the standard Alnor velometer and its several attachments. Ventilation measurements were supplemented by information from the several engineers and consultants responsible for planning and installing the systems.

Detailed Studies

FABRIC COATING—Solvents used for this work varied considerably, depending on the nature of the rubber coating. For natural rubber, petroleum naphthas were used almost without exception, some toluene being incorporated in occasional formulas. Coatings of

synthetic rubbers, however, required solution in the more toxic solvents. At the present time, benzol has been replaced largely by toluol or trade-name processed petroleums which contain a large proportion of toluol. Some synthetic rubber coating mixtures were diluted with small amounts of petroleum naphthas. Although the chlorinated compounds previously mentioned are solvents for synthetic rubbers, these materials were not encountered in fabric coating departments.

The dispersed rubber was spread on strips of fabric on a standard coating machine. In some plants the rubber suspension was fed to the doctor blade by hand from a pail while, in other installations, lines were used. At the doctor blade a controlled thin coating was spread on the fabric, which then passed over heated coils to evaporate the solvent before the fabric was rewound. The drying time depended on the type of solvent used.

The obvious control method for the evaporated solvents is enclosure and exhausting of the drier. The necessary openings in such an enclosure are those for entrance and exit of the fabric. Several variations of this general procedure were seen. On one, exhaust air was removed from above the fabric, while in another, air was exhausted from below the steam coils. One installation provided hinged flaps along both sides of the drying tunnel to allow easy access to the fabric throughout its route. These flaps were lowered while the machine was in operation.

The design of one system indicated certain desirable features of such an installation. From each of 12 coating machine drying tunnels, handling 2.5 gallons of solvent per hour, 5000 cubic feet of air per minute (c.f.m.) were exhausted. This amount of air and solvent would produce about 300 parts per million (p.p.m.) average concentration of toluol in the duct work, allowing an adequate safety margin below the explosive limit. The overhead exhaust from the tunnel was sufficient to produce a calculated inward velocity at all openings of about 150 feet per minute (f.p.m.). The minimum measured velocity was 100 f.p.m. Fresh tempered, humidified, and filtered air was supplied to the room at the rate of 64,000 c.f.m., slightly more than the total exhaust. The principal supply grilles were overhead at the feed and take-off ends of each machine, and were baffled to prevent disturbance of the air flow into the drying tunnels. This arrangement supplied adequate fresh air to the operators. Air change in the workroom was at the rate of 40 per hour. This system had been designed for the possible use of benzol as a rubber solvent, although toluol substitutes were being used at the time.

Average concentrations of combustible vapor in the workroom were about 50 p.p.m. Concentrations between 30 and 60 p.p.m. were general throughout the room, both at operating positions at the doctor blade and at locations between machines. The maximum concentration found was 150 p.p.m. of combustible vapor, almost entirely petroleum naphtha. This sample was obtained at the head of one machine while the doctor blade was being cleaned with gasoline. Several bottle samples brought back to the laboratory for spectrographic analysis were in good agreement with the combustible indicator.

These results indicate the effectiveness of this system for controlling solvent vapors during fabric coating. While it is probable that such an elaborate system would not be required for the solvents then in use, it is felt that this system could be used safely with benzol. It might be made more economical by decreasing the size of openings into the driers, thus reducing to a minimum the free area through which air may enter. For such drying operations, it is recommended that the exhaust capacity per drier be designed to create at least 100 f.p.m. velocity through the necessary openings. Where possible, dope should be fed to the doctor blade by means of pipe lines. The use of gasoline washes for doctor blades and rolls is also recommended in preference to the more toxic aromatic compounds.

2. BALLOON FABRICATION—Solvents used in cements for joining sections of balloon cloth were similar to those previously discussed. Several different solvent formulas were encountered including pure benzol, toluol-petroleum naphtha mixture, and a mixture of a toluol substitute with carbon tetrachloride and a trace of carbon disulfide. The aromatics or aromatic-petroleum mixtures were most widely used. Both petroleum naphthas and ketones were used as washes.

Military balloons were assembled by cementing together relatively small sections of coated fabric, the individual sections being cut to form the curved surfaces required. Edges to be joined were washed free of dirt and then contiguous edges were coated with cement which was allowed to dry to tacky stage. They were then joined together, rolled tight, and a reinforcing tape applied after the exposed seam had been coated again with a small amount of cement.

In the assembly of barrage balloons which were relatively small, about 75% of the joining may be done on work benches of convenient height and sufficiently wide, usually about four feet, to accommodate material to make up about one-quarter of the final balloon. These larger sections were then joined together on the floor, and certain appurtenances were cemented to the surface. Finally the balloon was partially inflated and last reinforcing tape and patches applied to the inside.

Assembly of barrage balloons is always done in large volume rooms. This fact is itself a safety factor since considerable natural dilution of vapors can occur. In the several plants surveyed, the volume varied from 540,000 to 1,350,000 cubic feet, and the floor area from 18,000 to 45,000 square feet. With a maximum of 110 persons employed at one time in such workrooms, it is clear that the space per person was relatively high.

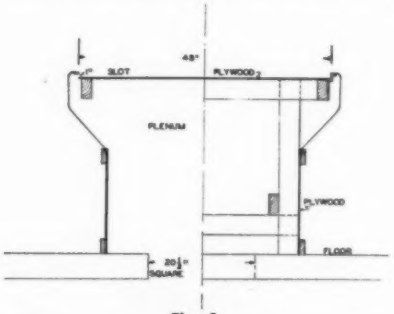

Fig. 1.
Section on Lateral Ventilated Table. Air Flow = 50 c.f.m. per square foot table surface

Since a large proportion of the cementing is, or may be, done on benches, the logical control measure for solvent vapors is source ventilation at the tables. Several arrangements were seen for realizing this purpose, including ventilated canopy hoods over the tables, slot hood ventilators over the center of the table, and lateral slot exhaust along one or both sides of the table. Since large surfaces of solvent or washes evaporate intermittently, control measures which reduce peak concentrations to the general room concentration, are obviously effective.

Fig. 1 shows cross-section details of a laterally ventilated table which was satisfactory in controlling peak exposures, and practical in production. Each of several work tables, 40 x 4 feet in top dimensions, was provided with 8,000 c.f.m. exhaust. Distribution of air

over the slots was accomplished by making the entire space under the table a plenum chamber, with three connections to the exhaust duct. Air velocities over the surface of the table varied from a minimum of 50 f.p.m. at the center line to 1,200 f.p.m. at the slot. Air distribution was good over the entire system.

The amount of ventilation was about half that suggested for similar lateral exhaust of plating tanks.[7] In this case, however, there were no convection currents to be overcome, the extraneous energy sources being room turbulence, and the motion of the cementing brush. Since control was effective, as will be shown later, it is suggested that for such tables, the amount of ventilation be computed from the formula

$Q = 50\ LW$

where Q = quantity of air to be exhausted—c.f.m.
L and W = top dimensions of the table—ft.

As an alternative, a few types of patches for balloons were cemented on downdraft tables such as that shown in Fig. 2. This table was used with considerable success for removing solvent vapor after saturating frayed-rope handle patches, the rope being sufficiently porous to allow air to pass through it. A cheese cloth covering over the grille to prevent plugging of the holes was changed several times per day. Total air flow through the system was about 3,500 c.f.m.

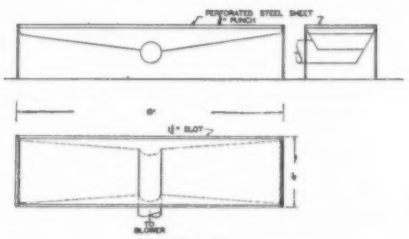

Fig. 2.
Downdraft Ventilated Table

As a rule, table ventilation as described above will furnish several air changes per hour in the workroom. In addition, from one to three changes can be expected from leakage at windows and doors. Except under very unusual conditions, five to 10 air changes per hour were sufficient to prevent accumulation of vapors in these workrooms. Therefore, further general air dilution appeared to be neither necessary nor desirable. As a guide for determining the adequacy of dilution, table I shows approximate required quantities of diluting air per hour per gallon of several commonly used solvents.

In none of four balloon rooms surveyed was the average concentration over 50 p.p.m. of individual or mixed vapors. As indicated previously, this is attributable to the fact that all of the workrooms were very large, and natural and forced ventilation was sufficient to prevent accumulation of vapors. However, local concentrations reached peaks in some locations well above the toxic limits. It is doubtful that even these exposures were above threshold limits in the daily average. In one plant area where ventilated tables shown in Fig. 1 were used, table cementers had no exposures to benzol above 20 p.p.m., their average and peak exposures being that of the general room air in the table cementing area, i. e., 10 to 20 p.p.m. Vapor concentration in the air entering the ventilating slot was up to 300 p.p.m. In another area, however, where the ventilating installation had not been completed, operators had an average exposure while cementing of 60 to 70 p.p.m. benzol, with peak exposures of about 175 to 200 p.p.m. At another plant where ventilated tables were used for a smaller proportion of the total work, average room concentrations of total combustible vapors were about 40 p.p.m.; individual exposures at ventilated tables were in the range of 40 to 70 p.p.m., while exposures near unventilated tables averaged slightly higher with peak concentrations in the range of 200 to 300 p.p.m. At the ventilated table shown in Fig. 2 in this plant, operator exposures were at the general room average of 40 p.p.m.

TABLE I.

Solvent	Allowable concentration p.p.m.	Required air per hour per gallon (cu. feet)
Benzol	100	350,000
Toluol	200	150,000
Carbon tetrachloride	100	325,000
Ethylene dichloride	100	400,000
Carbon disulfide	15	3,450,000

At floor cementing operations where large sections of balloon fabric were assembled, no additional ventilation was provided. Tests at floor cementing stations were uniformly low for solvent vapors, being in the range of 20 to 80 p.p.m. in the breathing zone. Usually the operator moved away from the evaporating solvent and thus escaped maximum exposure. It appeared, therefore, that if adequate ventilation existed in the workroom for general dilution, no further ventilation was necessary at floor cementing stations. Some advantage may be gained by placing circulating fans and tempered air inlets in such a position as to create mild air movement across floor cementing areas to dilute the vapors more rapidly.

Final balloon assembly required a few operators to work inside the partially inflated balloon applying finishing tapes and completing a few terminal seams. Unless air is continually fed to the balloon, its interior is a confined and unventilated space of about 15,000 cubic feet. Evaporation of solvents in such a space may build up rapidly a relatively high concentration as shown in the upper curve of Fig. 3, which shows results of tests in an unventilated balloon. Over a period of 1½ hours, concentration of combustible vapor increased regularly to 450 p.p.m. The lower curve of the same figure shows results in another balloon into which air was continuously fed from the inflating blower at a rate of about 1,000 c.f.m. and allowed to escape from a second port. Under conditions similar to those of the first case, the concentration increased slowly to only 140 p.p.m. and appeared to be at a peak plateau. When operations ceased, the concentration dropped rapidly. It can be calculated that without ventilation, concentration of benzol within the balloon would have increased in the same length of time to about 350 p.p.m. The procedure required no new equipment, and only the slight operating modification of smothering the balloon at a convenient degree of inflation. There was no inconvenience to operators, and a decided reduction in the atmospheric contamination. It was found during this investigation that nearly all of the vapor in the balloon was due to immediate operations, and only a small part of it came from previously entrapped vapor or solvent.

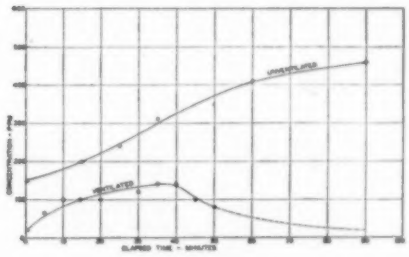

Fig. 3.
Vapor Concentrations in Ventilated and Unventilated Balloon

3. AIRPLANE FUEL TANK FABRICATION—Ethylene dichloride was the most toxic solvent used in the fabri-

cation of self-sealing fuel cells, others being ketones and petroleum naphthas.

Fuel cells were fabricated by cementing together, over a form, several layers of natural or synthetic rubber, some of which were coated or calendered into fabric and some of which were in sheet form. Single plys were tailored by hand to fit a mold which is later removed by disintegration. For the inner ply, which is of synthetic rubber to resist the action of gasoline, ethylene dichloride was used as a cement solvent and as a tackifier. The plys of natural rubber may be cemented and washed with petroleum naphthas.

A small part of the preliminary cementing may be done on ventilated tables such as those previously described. For the most part, however, cementing and tackifying were done on the formed cell which, for convenience, was placed on a low pedestal. In this position, cement and tackifier were brushed intermittently over large areas to prepare seams, insertions, and edge reinforcements as well as to tackify surfaces for cementing subsequent layers. Without adequate ventilation, those operations may cause considerable vapor exposure to operators and others in the vicinity.

At the time of the survey, the production rate was low and no air samples representing full production could be obtained. Samples taken during a period of low production in the summer were uniformly low for ethylene dichloride, being in the range of 20 to 90 p.p.m. without induced ventilation. Natural ventilation from open windows was good. It is well to note from Table I that ethylene dichloride requires a larger amount of diluting air to maintain safe concentration than does an equal volume of benzol.

Without the test of actual installations, none of which have been seen in operation, we are reporting two methods which appear to be of possible value in reducing potential vapor exposure from this work. In any case, it is important to segregate work requiring the use of noxious solvents from that in which petroleum naphthas or gasoline is an adequate solvent.

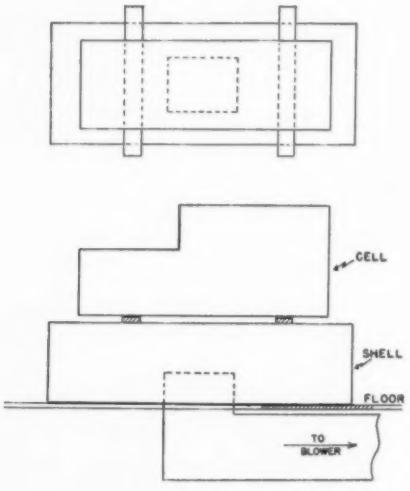

Fig. 4.
Sketch of Ventilation for Fabrication of Fuel Tanks

Fig. 4 indicates an arrangement for source ventilation at the working surfaces of the fuel cells. The pedestal on which the cell rests is an open-bottom shell, the top of which approximates the shape of the cell but leaves an annular ring around it. Through a floor duct, sufficient air is drawn to create a downdraft past the top edges of the cell. It is felt that the velocity at the working surface should be about 100 f.p.m. for adequate control. For calculations of required air, the following formula approximation:

$$Q = 200\ H\ (L + W)$$

Where Q = quantity of air to be exhausted — c.f.m.
H = distance from top of shell to top of cell — ft.
L & W = length and width of shell — ft.

For such a system, supply air must be so distributed as not to create turbulence at the working surfaces.

As an alternative, work on the cells may be done in booths from which sufficient air is withdrawn to create a face velocity of about 100 f.p.m. This arrangement should give adequate control if work is done from the face side of the booth. Air should be withdrawn from the booth near the floor level. The amount of air required is approximated by the formula

$$Q = 100\ HW$$

where H & W = face dimensions of the booth — ft.

This system might have some advantage of economy since axial flow fans could be used and little or no duct work would be required if such booths were located along outside walls.

4. RUBBER BOAT AND PONTOON FABRICATION.—During this survey, only gasoline or other petroleum naphthas were being used as washes and cement solvents, since the fabric coating was entirely of natural rubber. Therefore, no samples were taken at this operation. The work is similar to that in fabrication of balloons, some of the cementing being done on tables and some on the floor. No cementing was required in completely enclosed spaces.

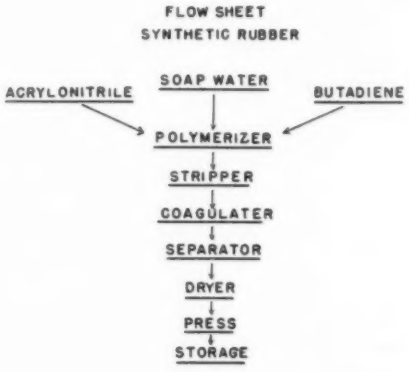

Fig. 5.
Flow Sheet—Buna N

Although the health hazard from gasoline vapor was not severe, one plant had under consideration a design for exhaust ventilation to reduce vapor concentration. The quantity of air to be exhausted from and made up in the workroom was based on the average hourly consumption of solvent. Gasoline vapor was to be diluted to about 100 p.p.m., the air being withdrawn in such a way as to provide source ventilation for cementing and washing job. Table operations were to be ventilated as previously described, with somewhat lower air flow per square foot of table. For cementing on final assembly of cylindrical shapes, downdraft ventilation was to be provided from the base of the pedestal on which the inflated part was being assembled. For dilution at locations where local exhaust was difficult or impossible, an excess of make-up air was to be directed toward the working station through movable semi-rigid canvas ducts, the supplied air to be filtered and tempered.

5. SYNTHETIC RUBBER PRODUCTION—Although a majority of the synthetic Buna rubber to be produced will be Buna S (butadiene-styrene copolymer), some Buna N (butadiene-acrylonitrile copolymer) will continue in production. Of the materials used, only acrylonitrile offers a potential serious health hazard.[2] This hazard is largely one of acute poisoning, according to present knowledge, but it has been indicated that acute poisoning may occur at low concentrations.

The flow sheet shown in Fig. 5 indicates the steps in processing raw materials to synthetic Buna rubber. Organic reactants were stored in tanks and handled by pipe line throughout. The polymerization reaction was accomplished in emulsion, usually in soap water. The reaction vessel was closed and under pressure up to 65 pounds per square inch. In the three plants visited, no attempt was made to recover excess acrylonitrile, so that the reacted mixture was transferred directly from reactor to a semi-enclosed vat where addition of electrolytes caused coagulation. From this point to the drier, there existed potential exposure to excess acrylonitrile, since operations were either open or semi-enclosed. Some variation in procedure was seen in the three plants; for example, the lack of a drying step in one of them.

No attempts were made to obtain air samples for acrylonitrile since no adequate method existed. Observation of the process, however, indicated several points at which precautions should be taken when acrylonitrile is used;

(a) Leaks or breaks in pipe lines carrying acrylonitrile would be serious hazards. Personnel should leave the affected area immediately, and those who return to close valves and remove the residue should be equipped with gas masks approved by the U. S. Bureau of Mines for protection against organic vapors. Spilled nitrile should be washed down drains with copious amounts of water. Contact with the liquid should be prevented by use of rubber footwear and gloves, as it may be absorbed through the skin.

(b) Cleaning of reaction vessels after each batch operation is a severe potential hazard. Before a man enters the vessels, it should be purged by ventilation through a duct extending to the bottom of the vessel. The volume of air purged should be at least twenty times that of the container. In addition, the man entering the reactor should be equipped with a life-line manipulated by another person outside the tank, and rubber footwear and gloves to prevent skin contact with the sludge and loose material in the tank.

(c) Under normal operating conditions, some vapor exposure was possible in operations from the coagulator to the final press baling. To expedite inspection of the material, part of the top or inspection openings of the coagulator were usually left open. The vat should be equipped with sufficient suction ventilation to create an inward draft of about 100 f.p.m. through such openings to prevent escape of unreacted vapors.

Dewatering and washing operations at the separator may produce vapor exposure. Either enclosure of filters or adequate local exhaust should be provided. Centrifuges, particularly, may produce considerable displacement of air and vapor into the surrounding atmosphere, and adequate exhaust ventilation should be provided at the periphery of the basket. Additional general ventilation may be required also.

Ventilation of enclosed conveyor driers is essential for the removal of water vapor and other residues evaporated from the stock. To prevent escape of these materials into the workroom, ventilation should be sufficient to provide an inward air velocity of 100 f.p.m. at all openings of the drier.

As far as is now known, the dried product presented no further hazard, and the final baling operations was innocuous. However, if baling or milling is done on the undried product, as noted in one plant, some vapor may be evolved from heat of compression. In such case, local exhaust ventilation should be provided to remove contaminants from the mill or press.

Conclusion

INCREASING use of synthetic rubber may intensify the use of toxic solvents in rubber fabrication. Operations now performed with petroleum fractions may require aromatic solvents, or others of equal toxicity. Such changes must be considered as introducing industrial hygiene problems, whose solution should be made an integral part of the planning program so that production will not be hampered at a later date by illness or psychological disturbances among the operators.

The authors are grateful for the assistance throughout the survey of DR. A. D. BRANDT, P. A. Sanitary Engineer, and to DR. P. A. NEAL, Surgeon, both of the U. S. Public Health Service.

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Minimum Requirements for Safety and Industrial Health in Contract Shipyards

THE U. S. NAVY Department and the U. S. Maritime Commission have collaborated on the development of minimum requirements for safety and industrial health in contract shipyards. A manual of tentative standards was developed following a survey of the greater number of shipyards throughout the United States by experts in safety and in industrial health assigned to the U. S. Maritime Commission. These tentative standards were discussed in detail at a national conference conducted under the auspices of the Navy and the Maritime Commission held in Chicago December 7 and 8, 1942. The tentative standards with recommended changes were unanimously agreed upon at this conference and have now been published by the Government Printing Office. The regulations having to do with industrial health are given below.

In the development of these standards it has been recognized that it is vitally important to conserve manpower and promote the physical welfare, health and safety of what shortly will amount to one million workers in shipyards.

In carrying out the requirements of these minimum standards, JOHN ROCHE is serving as Chief Safety Consultant and PHILIP DRINKER as Health Consultant. Mr. Roche has a staff of four full-time men, one in each regional district, and Prof. Drinker has two industrial hygienists and a doctor on the Atlantic and west coasts, and an industrial hygienist in the Gulf and Great Lakes area.

The fact that the majority of these shipyards are built on made-land may introduce hazards which are difficult to avoid. Most of the yards include only a minute percentage of experienced workers, which also adds appreciably to the difficulty of the safety and health problems.

The introductory message to these requirements addressed to all contractors constructing ships for the Navy and the Maritime Commission, as signed by Frank Knox, Secretary of the Navy and E. S. Land, Chairman, U. S. Maritime Commission, is as follows:

"Each contractor is hereby given notice that the Navy Department and the Maritime Commission will expect full and complete compliance with the minimum standards which bear the approval of the Navy Department and the Maritime Commission, and each is requested to give full cooperation to the consultants on health and safety who will be charged with the coordination and supervision of the safety and health programs of the two agencies. The cumulative restriction of manpower makes speedy attention and comprehensive action in respect to the subject matter hereof of vital importance."

S and H-1. Introduction

1.1 The standards for industrial health and safety as presented in this manual cover only minimum requirements. It is not to be assumed that compliance with these minimum standards is insurance of the development of good health and safety records.

1.2 It is recognized that in many shipyards, standards for health and safety are already in effect which go beyond the requirements of those listed here. The Maritime Commission and Navy urge that any standards of higher level be continued and that where substandard conditions of health and safety exist, they immediately be brought to the required standard or better.

1.3 In all cases the use of the words *shall* or *must* indicates that compliance with that section of the minimum requirements is mandatory. Where the words *should* or *may* are used the section may be considered desirable but not necessarily mandatory under certain circumstances which the contractor in his discretion may determine.

Minimum Requirements for Industrial Health

H-2. Medical Facilities

2.1 *Personnel.*—Yards employing up to 5,000 men should have two full-time physicians, and one additional physician for each additional 5,000 men. Yards with less than 2,000 to 3,000 men will not need full-time physicians.

2.2 Specialists in the various branches of the medical profession available in the area should be consulted as indicated.

2.3 Yards employing up to 5,000 men should have in the main dispensary six full-time nurses and three additional nurses for each additional 5,000. Additional nurses will be required for first aid stations.

2.4 There should be at least three clerks employed in the medical department for each 5,000 employees.

2.5 One ambulance driver should be available per ambulance per shift.

H-3. Physical Facilities

3.1 The medical department should be provided with:

a. A waiting room with suitable registration facilities.
b. A general treatment room.
c. An eye treatment room.
d. A minor surgery room.
e. A ward with three beds for the first 5,000 employees, and one bed for each additional 10,000.
f. Doctors' offices and private examining rooms.
g. A nurses' office and dressing room.
h. X-ray room for yards employing 5,000 men and above.
i. A physiotherapy room.
j. Toilet facilities for doctors, nurses, and patients.
k. A storeroom for general medical stores.
l. X-ray files and viewing room.

3.2 First-aid treatment rooms, manned by nurses, should be provided wherever there is overcrowding at the main dispensary and loss of time due to distance from shipways and shops. These sub-stations may be located under building ways or near locations where the number of men working is large so that the distance a man need travel to a substation will not exceed approximately 400 yards.

H-4. Equipment

4.1 The following equipment should be provided:

a. One ambulance for each 15,000 employees, or reasonable fraction thereof, with an ordinary passenger car always in reserve.
b. In some yards a station wagon is used satisfactorily inside the yard and an ambulance used only for trips outside.
c. An x-ray unit for wards employing about 5,000 men and above.
d. Medical and surgical stores required for minor surgery, eye injuries and physiotherapy.

H-5. Records and Forms

5.1 The following records and forms are recommended:
NOTE.—*In an emergency no form need be filled out.*

a. A form authorizing the workman to report to the medical department for examination or treatment issued by a foreman or leading man or other supervisor. This shall show time of issue, arrival at dispensary, discharge from dispensary and return to work.
b. Appointment form for revisits and retreatments issued by the physicians and nurses.
c. A disposition form issued by physicians and nurses indicating return to work, hospitalization, to home, or other disposition.
d. A complete and accurate permanent filing system recording personal data, nature and cause of injury, diagnosis, treatment, disposition, and results.
e. The necessary state and insurance company forms.
f. Daily report to the safety department showing all new cases for the day, together with the nature and cause of injury, and the *diagnosis.*
g. The adoption of the standard nomenclature when made available by the Council on Industrial Health of the American Medical Association, Chicago.

H-6. Examinations

6.1 Physical examinations to insure proper placement of employees shall be given.

6.2 Periodic check examinations shall be given men working in occupations potentially hazardous to themselves or others, as for example to crane operators, locomotive and hoisting and portable engineers. Periodic check examinations should be given men in jobs in which there may be health hazard, as for example to sand blasters, radium and x-ray workers, and paint sprayers.

6.3 Special examinations such as x-ray, seriologic and urinalyses shall be given in the individual case as indicated and in accordance with local needs.

H-7. Air Raid Precautions

7.1 The medical department shall locate, equip, and maintain such emergency first aid dressing stations as may be deemed necessary to handle air raid casualties.

7.2 A certain number of yard employees shall be trained in first aid procedures to render assistance to the medical department in handling air raid victims.

7.3 Close cooperation should be maintained with the local civilian defense officials in order that evacuation and care of air raid victims may be carried out to the best advantage.

7.4 In keeping with local army and navy regulations, steps should be taken to provide protection of dispensaries by sandbags, or otherwise, from fragments and concussion of bombs.

H-8. Responsibilities of the Medical Services

8.1 Frequent inspection of the yard by the medical staff shall be required in order that physicians may become familiar with shipyard jobs and thus help intelligently in preventing accidents and occupational disease.

8.2 Close collaboration shall be maintained with the safety department especially in regard to records of accidents and absenteeism.

8.3 It shall be the joint responsibility of the medical and safety departments through the supplies department to know the composition of paints, thinners, paint removers, and other chemicals used in the yard, and to see that the workers exposed are protected by the best safety practices.

8.4 As in the general practice of medicine the confidential relations of doctor and patient shall be maintained.

8.5 It is certain that in the near future women in large numbers are to be employed in the mechanical trades. It is necessary in shipyards to make special provisions for this class of patients. This will necessitate the establishment of separate waiting, treatment, and examining rooms. In

yards where the number of employees is large, it may be logical to establish a separate dispensary for the handling of women patients.

H-9. Sanitary Inspections

9.1 *Cafeterias and canteens.*—It shall be the duty of the medical department to adapt from Army and Navy standards, in reasonable conformity with the local health department rules, an inspection scheme to include pre-employment examination of food handlers, quality and quantity of food, general cleanliness and comfort, screening, dishwashing, garbage and waste disposal. These inspections shall be made at unscheduled times and never less than once each week.

9.2 *Water supply, sewerage, and waste disposal.*—In cooperation with Maritime and Navy engineers the medical department shall inspect and report upon the above as often as seems advisable, but not less than twice yearly.

9.3 *Salt tablets.*—Salt tablets shall be made available to all employees and shall be kept in covered dispensers approximately located.

H-10. Respiratory Protective Equipment for Shipyards

The U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, Penna., maintains a laboratory which tests and *approves* for use in industry respiratory protective equipment of all kinds. The Maritime Commission and Navy will require the use of *approved* equipment throughout all yards. The safety department shall be responsible for instructing men in the proper use of such equipment and for the maintenance of ample supplies.

10.1 Details of Bureau of Mines respirators with names of manufacturers, prices, and descriptions can be obtained from the Bureau or from the Maritime Commission.

10.2 The safety department shall be responsible to the management for cleaning and sterilizing all such equipment as often as may be agreed upon with the medical department. (A method for such sterilization is included in these standards; see section H-12.0.)

10.3 *General requirements for respirators.*—

a. Adequate protection as defined by American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs. Handbook H-24, Nov. 1, 1938. Superintendent of Documents, Washington, D. C.; price 15c.

b. Comfort (light weight and not obstructive to vision).

H-11. Jobs Requiring Respiratory Equipment

11.1 *Dust.*—

JOBS	PROTECTIVE DEVICES
Silica of Sand Dusts (as in sand blasting)	(1) Abrasive blasting helmets. (2) Dust respirator.
Lead Dust (as in mixing paint)	(1) Air line respirator. (2) Lead dust respirator.
Asbestos (as in covering pipes)	(1) Air line respirator. (2) Dust respirator.

11.2 *Metal fumes and smokes.*—

JOBS	PROTECTIVE DEVICES
Lead and zinc oxide from welding and burning.	(1) Air line respirator. (2) Fume respirator for lead. (3) Dust respirator for zinc oxide.

11.3 *Solvent vapors.*—

JOBS	PROTECTIVE DEVICES
Spray painting, both indoors and outdoors. Paint removing, usually indoors Cementing, usually indoors Cleaning, usually indoors Degreasing, usually indoors	(1) Air line respirator. (2) Chemical cartridge respirator.

11.4 *Acid gases and mists.*—

JOBS	PROTECTIVE DEVICES
Pickling (indoors) Cleaning (indoors) Degreasing (indoors)	(1) Mist respirator. (2) Chemical cartridge respirator.

11.5 *Alkali mists.*—

JOBS	PROTECTIVE DEVICES
Cleaning (indoors) Degreasing (indoors)	(1) Mist respirator. (2) Chemical cartridge respirator.

11.6 *Asphyxiating atmospheres.*—

PROTECTIVE DEVICES
(1) Nose mask.
(2) Oxygen-breathing mask.
(3) All-service mask.

11.7 *Air supply for air-line masks of all kinds.*—Air at a comfortable temperature and free from odors and excessive moisture sometimes is difficult to furnish, especially for outdoor jobs in winter. Air quality and temperature shall be tested by the Safety Department and shall meet the suggestions of the American Standard Safety Code for air-supplied respirators (sec. 10.3a).

H-12. Sterilization of Respirators

12.1 Each worker who needs a respirator should be assigned his own respirator. Where this is not done, it is important that the respirator be sterilized in addition to being changed. Adequate sterilization may be accomplished by—

a. Washing the rubber and metal parts with soap, a brush and warm water, after which the respirator is sterilized by immersion for 10 minutes in a solution of formalin made by placing one part of 40% formaldehyde solution into nine parts of water.

b. Washing the rubber and metal parts with soap and warm water, after which the respirator is sterilized by dipping in 3% solution of carbolic acid, a 2% solution of lysol, or a 70% solution of denatured alcohol.

c. Subjecting the respirator to sterilization by a moist atmosphere of antiseptic gas, preferably formaldehyde, for a period of ten minutes at room temperature.

d. After following any one of the outlined procedures, the respirator should be rinsed with water and hung up to dry. The respirator should not be used until it has been dried thoroughly.

e. The filters, felt screens, and elastic headbands should be removed, if detachable, before washing or sterilization of the respirator, unless it is evident that washing and sterilization will not harm these parts.

12.2 The National Safety Council has issued an Industrial Data Sheet No. D-Gen. 16, "Cleaning and Sterilizing Goggles and Respiratory Equipment."

H-13. A Guide for Prevention of Industrial Disease

13.1 Eight common types of disease and methods for their prevention are given in the following sections. Help in applying these methods will be given by the local Safety Department and by safety and medical consultants of the Navy Department and the Maritime Commission.

13.2 *Flashburns and foreign bodies in the eye.*—

a. Effects on workers: "Flash" is a surface eye burn resulting from even momentary unprotected exposure to the welding arc. In this condition the eye is painful and sensitive, especially to light. An eye flash shall be treated only by the doctor or by methods he has prescribed.

b. Foreign bodies in the eye shall be removed only under the doctor's orders or by methods he has prescribed. Like flashburns, they are preventable.

c. For safe practice:

All workers:

1. Whenever near welding areas wear antiflash goggles which have been approved by the Safety Department.
2. Wear safety goggles when grinding, chipping, buffing, scratch-brushing, or forging.

Welders:

3. Wear approved antiflash goggles even when helmet is being worn.
4. Use portable screens to protect the eyes of fellow workers.

13.3 *Lead poisoning.*—

a. Sources: In general, any job in which dust, fume, or smoke from any substance containing lead is breathed daily.

b. For example:

JOB:	WHEN MATERIAL IS:
Welding Cutting Burning Shrinking Grinding Buffing Spray painting Mixing paint pigments	Metal, coated with paint containing lead Lead Lead pigments

c. Job can be done safely with:

1. (a) Special ventilation: Use a local exhaust hood approximately 8 inches from the job and drawing at least 200 c. f. m. into the hood with filtration of the discharge, or discharge, to a place where the contaminated air will

not be breathed, or
(b) Wearing of fume respirators, or
(c) Wearing of supplied air respirator.
2. Periodic medical examination which includes blood and urinalyses.

13.4 *Solvent vapors.*—

a. Sources: In general, any job in which solvent vapors are breathed. For example:

Spray painting.
Painting.
Using paint remover.
Applying cements.
Paint brush and spray gun cleaning.

b. Job can be safely done with:
1. Segregation of such work, and
2. (a) Special ventilation as may be required.
(b) Provision of spray booths with exhaust system.
(c) Wearing of special respirators:
(1) For spray painting: Supplied air respirators or air line hoods.
(2) For other jobs: Chemical cartridge respirators.

(See H-10 on respiratory protective equipment.)

13.5 *Zinc fume fever (zinc chills or shakes).*—

a. Sources: In general, any job in which the fumes from heated zinc are breathed. For example:

JOB:	WHEN MATERIAL IS:
Welding	Galvanized metal
Cutting	Zinc
Shrinking	Zinc alloy
Pouring zinc alloys	Brass

b. Job can be safely done with:
1. Special ventilation: Local exhaust hoses or hoods located close enough to operation at all times to remove smoke completely.
2. Wearing of special respirators.

NOTE.—There are no known cumulative effects from zinc chills.

13.6 *Fiberglas.*—

a. Effects on workers: Men working with Fiberglas may develop a dermatitis or conjunctivitis which are skin and eye conditions. It is best to transfer to another job those who continue to be sensitive.
1. Both experimental and practical evidence show conclusively that the inhalation with Fiberglas causes no lung damage.
2. The cement used with Fiberglas may contain a toxic solvent such as carbon tetrachloride (CCl_4) which can cause severe illness or even death if the cement is used indoors with inadequate ventilation.

b. For safe practice:
1. Clothing: Supply loose coveralls with collars and sleeves buttoned over cheesecloth.
2. Goggles: Should be worn.
3. Shower: Should be taken rather than bath, at end of shift.

Respirators are usually not necessary, *but* if a cement containing a toxic solvent is used, proper protection either by ventilation or by a respirator must be supplied and used.

13.7 *Asbestosis.*—

a. Sources: In general, any job in which asbestos dust is breathed. For example:

JOB:	WHEN MATERIAL IS:
Handling	Asbestos
Sawing	Asbestos mixtures
Cutting	
Molding	
Welding rod salvage	

b. Job can be done safely with:
1. Segregation of dusty work and,
2. (a) Special ventilation: Hoods enclosing the working process and having linear air velocities at all openings of 100 feet per minute, or
(b) Wearing of special respirators.
3. Periodic medical examination.

13.8 Silicosis.—

a. Sources: In general, any job in which the dust of free silica (sand) is breathed daily. For example:

JOB:
Sand-blasting
Sand packing of pipes
Shot blasting of castings

b. Job can be done safely with:
1. Isolation of dusty process and, in addition,
2. Special ventilation: In the case of sand-blasting, the work should be done in the standard type of sand blast room, cabinet, or machine.
3. Special respirator for dust-containing free silica.
4. Periodic examination by doctor.

13.9 Dermatitis.—

a. Sources: Excessive or improper use of cleaning agents such as gasoline. It is not at all uncommon to find dermititis caused by excessive use of common soaps such as those used in laundering. Cutting oils, certain greases, certain insulating materials used on electric cables and conduits can cause dermatitis.

b. Job can be done safely with:
1. Precautions against excessive use of the causative agent.
2. Advice of the medical department in the use of protective salves and creams.

H-14. Ventilation Standards

14. The maintenance of proper working conditions shall be the responsibility of the safety department, whose staff shall work in close cooperation with the welding, paint, and electrical departments. Air analyses and tests shall be made by the safety and medical consultants of the Navy Department and the Maritime Commission as may be needed.

14.1 Ventilation is required to control temperature and to remove air impurities, as from welding and paint spraying.

14.3 Personnel of Department.—

a. Number:
1. The size of the ventilation crew will vary with the type of ship, equipment available, etc. The head of the safety department will be responsible for the organization of the safety department or division.
2. There shall be a ventilation supervisor on each shift responsible to the head of the safety department. Under the supervisor there shall be a sufficient crew to inspect and maintain good working conditions.
3. An EC-2 ship shall have at least one ventilation man aboard. Larger ships, or ships like carriers with considerable galvanized welding, shall have at least two ventilation men.
4. The number of ventilation men on the night shifts shall be in proportion to the construction crews.
5. The ventilation crew must have available a maintenance and repair crew of sufficient size to keep equipment on the job and operating efficiently. Long waits during which equipment is idle must be avoided.

b. Training:
1. The ventilation supervisor (that is, the safety engineer) shall be trained to handle the entire ventilation program in the yard. Local educational institutions, State Industrial Hygiene Units, Maritime Commission engineers, and other sources are available to give this training.
2. The ventilation supervisor shall organize classes, demonstrations, and short talks on standard procedures for ventilating specific spaces on the ships.

14.4 *Type of equipment needed.*—In ship construction, two types of ventilation are used—local exhaust as for removal of welding fumes at the point of origin, and general ventilation to supply fresh air to confined working spaces.

a. Local exhaust:
1. A common length for a local exhaust hose is forty feet. In ordering exhaust fans for use with local exhaust hoses, the following specifications should be met: Capable of drawing a minimum of 200 c. f. m. through each of 3-inch (or 4-inch) diameter flexible hose. Fans should have provisions for attaching three or more local exhaust hoses per unit.
2. In the interests of power economy, it is undesirable to move much more than 200 c. f. m. through each local exhaust hose.

b. General ventilation:
1. It is frequently desirable to introduce air into

large working spaces such as deep tanks, fore- or after-peaks. This is done in many yards by using a flexible fabric duct, with metal elbows, and a fan of about 5,000 c. f. m. capacity.

2. It is desirable sometimes to supply a quantity of fresh air into the double bottom. Here a 2,000 c. f. m. unit may be used.
3. These two examples represent the two extremes of this type of work, and therefore are the two extremes in fan sizes. Fan static pressures in each case should exceed four inches of water.
4. For general ventilation of a ship engineroom during construction, a 10,000 c. f. m. blower is recommended. On the other hand, operations in confined quarters where heat is generated (plate shrinking, for example) may use a small portable fan to circulate the air. For this purpose, small blowers of from 800 to 1,500 c. f. m. shall be provided.

c. Ventilating procedures:

1. Local exhaust shall be used whenever a welding operation is being conducted in a confined space, or whenever galvanized metal is being welded. Local exhaust is always a suction process. Never blow a stream of air upon a welding arc.
2. Many welders think that it is enough to hold the end of the suction hose in the same compartment with the welding operation. This is not so. In order to capture the welding fumes, the end of the hose must be within six or eight inches of the arc, assuming a 200 c. f. m. volume per hose. Beyond this distance, the suction hose is ineffective.
3. The air supply to a general ventilation fan must be fresh outside air. Recirculation of air already contaminated shall not be permitted. A minimum of 400 c. f. m. per welder shall be applied to a given working space such as a deep tank when general ventilation is used alone.
4. In warm weather, air movements or drafts are helpful, while in cold weather a minimum of air movement is desired and local exhaust will serve best. In temperate weather, it is most satisfactory to use a combination of local exhaust and general ventilation.

14.5 *Coordination of department with construction program.*—

a. The ventilation supervisor shall keep abreast of construction, and thus anticipate the ventilation needs.

b. The construction foremen shall inform the ventilation department of ventilation needs before the needs occur.

c. Blackboards, boxes, signal lights, or similar devices shall be installed on board and used to inform the ventilation department of immediate needs.

14.6 *Supplementary ventilating procedures.*—

a. Ventilating confined spaces, such as the fore- or after-peaks and deep tanks, is greatly simplified by the temporary removal or cutting through of certain plates.

b. For example, the fore-peak of a Liberty ship can best be ventilated by cutting a combination access and ventilation hole through the watertight bulkhead near the ship's bottom.

c. The tank top can be left off of the midship deep tanks until all welding has been completed in this space.

d. A side plate can be left or cut out of the engineroom at the bottom deck level.

S-9. Welding—Arc

9.1 All welders shall be made familiar with the hazards of their work and instructed in safe methods of performing the various types of jobs to which they are assigned.

9.2 Personal protection equipment used by welders shall include:

9.21 Welders' protective hood provided with the proper shade of filter type lens for protection against the harmful rays of the arc and a clear cover glass to protect the filter lens.

(a) The shades or their equivalent recommended are:
Up to 30 amperes—No. 6-7 Shade.
30 to 75 amperes—No. 8 Shade.
75 to 200 amperes—No. 10 Shade.
200 to 400 amperes—No. 12 Shade.
Over 400 amperes—No. 14 Shade.

(b) Shades may also be selected from the following table:

Rod diameter	Welding glass *shade No.*
1/16	10
3/32	10
1/8	10
5/32	10
3/16	12
7/32	12
1/4	12
5/16	14
3/8	14

(c) The welder's hood should be inspected at least weekly to detect possible light leaks, cracked protective glass, or badly fouled or missing cover glasses. Any defects discovered shall be corrected at once.

American Industrial Hygiene Association
News of Local Sections

Metropolitan New York Section

THE regular meetings of the Metropolitan New York Section have included a number of subjects of general interest presented by men with much specific information concerning them. In discussing the subject "Hand Cleansers," DR. A. G. CRANCH, Director of the Industrial Toxicology Department, Union Carbide & Carbon, pointed out that the hand cleansers required depended upon the nature of the soiling material. Solvents, mineral abrasives and strong alkaline solutions are objectionable materials for hand cleansing. Limited used of solvents, suitable abrasives like corn meal, non-alkaline soaps made from higher fatty acids are among the more desirable materials to be used. Adequate washings with cleansers and protective preparations decrease industrial dermatitis. It is important to note that many so-called cases of industrial dermatitis are incorrectly diagnosed.

"Electric Shock in Relation to Industrial Accidents" was the subject presented at the January meeting by DR. BARRY KING, Assistant Professor of Physiology, College of Physicians and Surgeons.

The February meeting took the form of a round-table discussion concerning industrial hygiene hazards introduced by the production of war materials. The principal sub-topics discussed were solvents, synthetic products, antioxidants, lubricants, catalysts and insecticides. This round-table discussion was led by ROY S. BONSIB, Chairman of the Section, and an active part was taken by P. W. GUMAER, G. E. FURGUSON, H. SEAGRAVE, DR. R. P. SIM and DR. A. G. CRANCH. The subject of the proper labeling of solvents received particular attention.

The March 31 meeting was addressed by LIEUT. COMDR. G. E. TWINING, USN, Safety Engineer, United States Navy Yard, Brooklyn, N. Y., on the subject of Ventilation of Welding Operations.

The officers of the Metropolitan New York Section are ROY S. BONSIB, Chairman, DR. A. G. CRANCH, Vice-Chairman, MORRIS B. JACOBS, PH.D. Secretary-Treasurer, F. J. PATTY and WILLIAM J. BURKE, Councilors. J. WM. FEHNEL, W. R. STEWART, G. E. FERGUSON and W. R. BRADLEY were appointed to the Program Committee, and F. A. PATTY and S. MOSKOWITZ to the Entertainment Committee.

Michigan Section

THE Michigan Industrial Hygiene Society has introduced a mimeographed news letter for its members, the first issue of which has appeared and is full of interest.

At the February meeting, the Michigan Section was addressed on the subject "Women in Industry" by MRS. MARGARET T. METTERT, Women's Bureau, U. S. Department of Labor and MISS IVA WAIT, A. C. Spark Plug Division, General Motors Corporation at East Lansing, Michigan. On March 10, W. P. YANT, Mine Safety Appliances Company, discussed "New World-Wide Industrial Hygiene Problems" following his recent survey of industry in England.

A committee on gas defense has

been appointed by the Michigan Section and is comprised of T. F. MOONEY, Ford Motor Company, Chairman, J. W. GIBSON, Chairman, Michigan Dept. of Labor and Industry, LLOYD GORDON, Michigan Dept. of Health, G. C. HAROLD, PH.D., Chrysler Corporation, W. T. KREBS, M.D., Hudson Motor Car Company, D. A. PADDEN, Ford Motor Company, and P. F. REZIN, Michigan Department of Health.

Pittsburgh Section

THE March Meeting of the Pittsburgh Section was held jointly with that of the Western Pennsylvania Chapter of the Western Society of Safety Engineers and was addressed by DR. CHARLES F. KUTSCHER on the subject "Occupational Eye Hazards." "Absenteeism" is to be the subject of JOHN F. MCMAHON, Managing Director, Industrial Hygiene Foundation of America at the April Meeting.

Chicago Section

THE results of a field investigation of over 100 vapor degreaser units at which nearly 500 vapor determinations were made was discussed under the title "Chlorinated Solvent Exposures at Degreasing Operations" by KENNETH M. MORSE, Industrial Hygiene Engineer of the Illinois State Department of Public Health, Division of Industrial Hygiene at the February meeting. Much information was given on the relative merits of ventilation and methods of manipulation of the work in keeping vapor exposures to safe limits. An open house session was held at the industrial hygiene laboratories of the Illinois Health Department prior to this meeting.

"Making Industrial Ventilation Do Its Job" was the subject covered at the March 23 meeting by CAPTAIN ALLEN D. BRANDT who has been assigned by the United States Public Health Service to the Safety and Security Branch of the Office of Chief of Ordnance, Chicago. CAPTAIN BRANDT'S discussion was followed by a presentation of some of the material available for ventilation equipment under the present priority situation.

A resolution was approved by the Chicago Section addressed to DONALD M. NELSON, Chairman War Production Board, concerning priorities on material and equipment for installation of exhaust ventilation and other occupational disease control measures. In this resolution it was noted that there is no provision in the present War Production Board organization for the review of priorities for material and equipment necessary for the protection of health of workers by men with first hand knowledge and experience in health problems and the materials requisite for their control; that the various sections of WPB now having jurisdiction have no coordinating unit for the handling of such priorities; that the present set-up has been such that these priorities are not assured of being handled in an expeditious and understanding manner; and that unadaptable substitute materials have at times been suggested or recommendations made that industry get along without certain protective measures. It was resolved that the Chicago Section appeal to Mr. Nelson to immediately institute a constructive policy regarding priorities for equipment and materials for the protection of the health of exposed workers so that any essential industry having health exposures may obtain such material and equipment without delay. The purpose of the resolution was to bring before the War Production Board the necessity of establishing a section which could handle materials and equipment relating to problems affecting health and the routing of such matters directly to this section for complete handling in order that workers might be given adequate protection. A copy of the resolution was referred to Frances Perkins, Secretary of Labor, and to Paul V. McNutt, Chairman of the Manpower Commission, in view of their concern for the manpower conservation problem.

Since a considerable number of members of the Chicago Section had worked with DONALD E. CUMMINGS and had valued his friendship, the Section voted at the meeting following his death that a suitable memorium be inscribed for transmittal to Mrs. Cummings.

The April Meeting of the Chicago Section is to be devoted to a discussion of occupational disease compensation. This subject will be handled from the point of view of the Compensation Commission, the legal aspects by an attorney and the medicolegal phases by an industrial physician.

MANUFACTURERS

A. S. ALOE COMPANY, St. Louis, has developed actual specific lists of equipment and materials, together with cost data, for industrial medical department installations of all kinds and sizes. These are complete in every detail. Furnished on request.

TIME, October 5, 1942, under the caption "New Burn Cure," described a "Biodyne" burn healing ointment for severe burns containing hormone-like substances extracted from yeast and fish liver oils. This ointment has been taken over by A. S. ALOE COMPANY, St. Louis, and will shortly be available from them.

A SERIOUS problem in arsenals and ordnance plants is the danger of tetryl dermatitis. West Disinfecting Company has been carrying on experiments to develop the highest possible methods of protection and has just completed two products specifically designed as aids in the prevention of lost-time from this cause. Ordnance Soap No. 8 is a special type of liquid soap used generously on the hands and arms or any other part of the body which may come in contact with tetryl or TNT. West Protective Cream No. 99, to provide an external protection to the skin, is made of a base containing a film which is not soluble in tetryl. As a word of caution, however, it should be borne in mind that some people can get systemic poisoning by breathing in the fumes of TNT and tetryl, and protective creams, of course, do not protect against this hazard. Samples of West's Ordnance Liquid Soap No. 8 and Protective Cream No. 99 with full data on their use may be obtained from the West Disinfecting Company, 42-16 West Street, Long Island City, New York, or from any of the 55 West Branches throughout the country.

S. H. CAMP AND COMPANY, Jackson Michigan, have been making available a considerable amount of educational and non-commercial literature to both educators and physicians for distribution. This year they are supplementing their efforts with a series of interesting full color posters, 18 x 24½ inches, one of which will be made available to industrial plants. The posters are available without charge on request through the Samuel Higby Camp Institute for Better Posture.

CURITY Research Laboratories (Bauer & Black) have successfully impregnated sulfathiazole into the gauze pad of the familiar Handi-Tape, where it remains combined with the gauze and is released only on contact with the moist wound surface. The entire dressing is sterilized after packaging and retains its bacteriostatic power indefinitely. Made with Bauer & Black's Wet-Pruf adhesive and non-raveling gauze, the Curity Sulfa-thia-zole Handi-Tape is ready for instant use in hospital outpatient department, doctor's office and home first aid emergencies.

PROLONGED chronic illness followed by sharp limitation of diet during a period of pre-operative preparation, especially when surgery of the gastrointestinal tract is contemplated, may result in a state of partial vitamin depletion. Most parenteral fluids routinely contain glucose, which sets up an additional drain on the vitamin B stores in the body. Post-operatively, nausea and vomiting occur frequently and there is often the necessity for complete restriction of food for days at a time. This sequence of events was clearly reproduced in a case recently reported (*Ann. Int. Med.*, 18:110, 1943). The patient developed a sore tongue and became uncooperative, disoriented, and confused. A dramatic change ensued after administration of riboflavin and nicotinic acid, with complete disappearance of the lesions within five days. A number of laboratory procedures have been developed in recent years to augment the clinical diagnostic approach to vitamin deficiency disease, but many of them require special equipment and are not easily adaptable for routine clinical use. Physicians may obtain a list of vitamin values of foods and a bibliography of important and generally informative papers on vitamins by writing Eli Lilly and Company, Indianapolis.

Reading time for the busy physician . . . 31 seconds

THE PHYSIOLOGIC AID TO NORMAL EVACUATION

Non-Irritant

FREEDOM from deleterious side-effects—so important in a therapeutic agent for the chronically costive—becomes doubly so when the constipation accompanies more serious gastrointestinal pathology.

In all such cases Serutan becomes a logical choice, since this unfortified hydrogel brings the water-fixing properties of its hemicellulose content to the formation of a demulcent, unctuous stool . . . easily voided without straining, leaking, "packing," or trauma. Indeed, Serutan is so completely free from physical or chemical irritation that its highly effective action may be enlisted even in cases calling for the most gentle management.

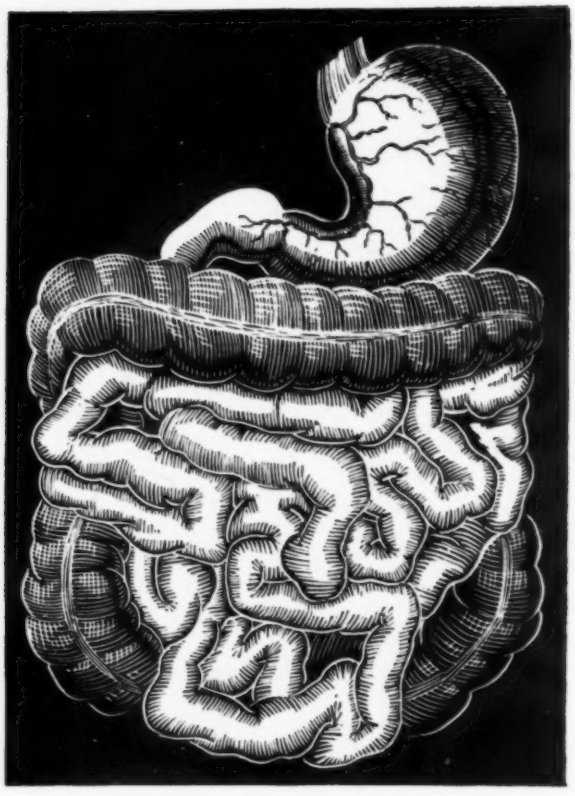
Available: In 4-oz. or 10-oz. packages, or in 30-oz. hospital size container.

SERUTAN, PROFESSIONAL SERVICE DIVISION, JERSEY CITY, N. J.

SERUTAN

Tranquillity

OF THE G. I. TRACT



***TRASENTINE-PHENOBARBITAL** is an effective relaxant for central nervous tension and smooth muscle spasm. It was designed to produce relative tranquillity of the G. I. tract.*

*TRASENTINE-PHENOBARBITAL** combines the well-known qualities of atropine and papaverine with the time-tested effectiveness of phenobarbital.

Additional benefits occur in that dryness of mouth, palpitation, Mydriasis and Cycloplegia are not found as with atropine administration

TRASENTINE-PHENOBARBITAL

AN EFFECTIVE AUTONOMIC AND CENTRAL NERVOUS SYSTEM SEDATIVE

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TRASENTINE-PHENOBARBITAL IN BOXES OF 40 AND 100; BOTTLES OF 500

*Trade Mark Reg. U. S. Pat. Off.

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